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SECONDARY SCIENCE CURRICULUM REVIEW

SSCR

BETTER SCIENCE:

Health and science education

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Curriculum Guides

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SECONDARY SCIENCE CURRICULUM REVIEW

SSCR

BETTER SCIENCE:

Health and science education

Curriculum Guide 9

Compiled by Di Bentley

Heinemann Educational Books/Association for Science Education
for the School Curriculum Development Committee

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Foreword

This is the ninth in a collection of twelve Curriculum Guides from the Secondary Science Curriculum Review, published jointly by Heinemann Educational Books and the Association for Science Education.

A Directory of Resources and a book, *Better Science: Making it happen*, which tries to set the Review's recommendations in the context of the whole school, will appear at the same time as the Guides. These will, when taken with earlier and forthcoming SSCR publications, including those from local groups, constitute the recommendations which the Review is making towards a broad and balanced science education for all the young people in our schools. The series title 'Better Science' is thus both apposite and self-explanatory. It is hoped that the current phase of the Review (1986–89) will achieve successful implementation of the recommendations.

But what is the status of these new publications apart from reflecting the formal approval and support of our major sponsors, the School Curriculum Development Committee and the Association for Science Education? From what sources have the recommendations within them emanated? Those readers unfamiliar with the history of the SSCR will find it explained within the Guides; but most will be aware that it set out as a project which tried fully to involve the practising teacher in the development of solutions to the problem of science for all. Thus, although the Guides have been compiled principally by the Central Team of the Review, they draw on the work of thousands of teachers in working groups over the past four years. Although the work of many of the groups is referred to in the Guides, it is not possible to refer to it all. In the *Directory of Resources* readers will find details of what many of these groups have produced. The writing of these Guides, however, would not have been possible without the groups' existence and the Review Central Team hopes that the content of the guides truly reflects their work. Thus the pronoun 'we', used within them, often reflects the view, gleaned over five years of consultation, of the practising teachers involved with the Review. On other occasions it can represent the views of the SSCR as constituted by the Central Team and Steering Committee and it is hoped that particular usage will be apparent from the context.

Jeff Kirkham
Mick Michell
Jeff Thompson
Dick West
(SSCR Curriculum Guide Editors)

Introduction

The purposes and organisation of the guide

The purpose of this guide is to help science teachers evaluate what contribution science education might make to the health education of young people in schools.

The aims of the guide are as follows:

1 to help science teachers form their own definitions of health and health education;
2 to enable science teachers to stimulate youngsters to share and periodically to reconsider their ideas and feelings about health;
3 to outline various approaches to teaching both science and health education;
4 to help science teachers place their health education lessons in the context of the whole curriculum;
5 to help science teachers contribute to or organise a cross-curricular course in health education in schools;
6 to help science teachers to evaluate courses and resources for health education;
7 to help science teachers to plan and develop cross-curricular courses, in the light of their own school health-education policy.

We have tried to meet these seven aims in the following way.

In this introduction we give a description of a health education lesson in a science context. We refer to it in subsequent sections to illustrate aspects of health and science education. During the life of the Review, we saw many such examples of good practice. We have not, however, reproduced one of these real-life examples because first, it would be unfair to select just one from the many which we saw and secondly, no single lesson contains all the elements upon which we would want to draw for illustration. Thus the narrative is a collage based upon many excellent pieces of good practice in health education by youngsters and their teachers. From this narrative we draw out six basic questions relating to our expressed aims:

1 What is health?
2 What is health education?
3 What do we teach?
4 Where do we teach it?
5 Who teaches it?
6 What methods do teachers use?

These become the section headings. The narrative also sets the tone of this guide; it gives an indication of how we approach each question and the ways in which we set out to answer them. A final question implicit in everything we discuss is:

Is health education working well?

Section 7 considers assessment in health education and Section 8 presents what the Review offers in the way of help for school assessment. Finally Section 9 examines aspects of evaluation in health education.

The narrative

This narrative describes some of the interactions between groups of youngsters in one lesson in a second-year mixed-ability science class. Prior to the lesson, the youngsters have been looking at accident statistics in a mathematics lesson. This has resulted in their science teacher being asked to help them understand what the statistics mean. She has set them the task of looking at sets of statistics — showing accidents in the home by age group — and trying to collect evidence as to what types of accident these might be. She has also asked them to hypothesise how such accidents might be caused, and test out their ideas.

The youngsters have already decided what they think has caused certain accidents, and for the last three lessons have been involved in designing experiments to see if their speculations are possible. In this lesson, they are discussing the evidence they have accumulated from their investigations, prior to presenting it to the rest of the class in the next lesson.

Group one

This group decided early on that science was about seeking out the truth. They wanted to know what *really* caused the accidents before they began to investigate possible preventions. Thus they decided to do a data collection exercise and try to analyse the results. As a means of data collection, they prepared a questionnaire which they used to interview elderly patients in the orthopaedic ward of a local hospital.

'I'm not sure which type of evidence we've collected is the most important', David said to his group.

'What do you mean by important?'

'Well, sort of telling.'

'Oh, do you mean which bits we should report?', asked Sadra.

'Oughtn't we to report everything we collected, then?', queried John.

'Well, let's see what we've got. There's the information from ROSPA [the Royal Society for the Prevention of Accidents], the statistics from the ambulance service, the ones from Age Concern. We could make graphs of these and present them on wall charts', said David.

'Um . . . but that doesn't really tell us very much. I mean it's a bunch of statistics. What about what caused the statistics? You know, the people behind the figures . . . Hey! That'd make a great headline . . . we could make our report like a newspaper article'. Donald was enthusiastic.

'I still think the best evidence we've got is the tape recordings of the old people in the orthope . . . ortho . . . thingy ward — you know, saying what caused it and how much it hurt and what happened to them when it did', said Sadra.

'Yes, but we didn't really learn anything scientific from them, did we?' Helen was scornful.

'Yes, we did. We learnt what sort of things generally cause accidents for old people in their homes. We can present that as evidence.'

'How? It's all on a tape recording', said John.

'Well, perhaps we could do a play; you know, have one of us act out what the old people told us, and have a reporter sort of drawing each bit together', suggested Susan.

'Hey! That's not a bad idea! We could . . .'

Group two

This group were busy testing out their theory of slipperiness. By looking at the statistics, they came to the conclusion that falls might be caused as a result of floor coverings being too slippery. They cut blocks of the same size of different linos, tiles and polished wood, and polished them with different layers of polishes. They then dragged weighed clay people of different masses, made in an art lesson, over the blocks, using a newtonmeter to record what they called the 'drag effect' of the polish. They obtained sets of results and are in the process of discussing these.

'Okay, okay, so there is a difference in the slipperiness if the person's heavier. I didn't think there would be, that's all', Neema protested.

'But is their weight difference enough to cause a serious accident?' asked Tony. *'You know . . . if you're fat you're more likely to fall and have a serious accident on a floor with a drag effect of 4, than if you're thin?'*

'Depends what you mean by "serious"'.

'Well, you know, broken leg or hospital treatment', replied Barbara.

'What about being dead? That's pretty serious!', joked Fay.

'They call that "fatal"!', said David.

'Yes, but there's a category of accident in these figures that we got from ROSPA that says "serious"'.

'What do they say "serious" means?', asked Fay.

'They don't. But it could be important in our experiment. I mean, if like you said, "serious" to you means "broken bones", how do we know what force it takes to break bones? Is that the same as our "slipperiness", for instance?', said Neema.

'It could make all our readings wrong'. Susan was despondent.

'We'll have to start again.'

'No, wait. We just need to understand what we mean by "serious". Then we can tell everyone when we report it, so that we can say our "slipperiness" wouldn't be enough to cause a serious accident, but people need to know which polishes might be the worst.'

'Talking about reporting! We've only got till next lesson . . .'

SECTION ONE

What do we mean by health?

This section examines ideas about health. It begins by giving a definition of health used in the work of the Review, and then tries to illustrate that health has a personal meaning for every individual derived from previous experiences. The section then examines teachers' theories on health, and suggests ways of helping young people to share their personal theories about health with each other and with their teachers. Two case studies are included at the end of the section.

What is health?

Health has been defined in a variety of ways by many organisations over the years. One of the best-known definitions is that of the World Health Organisation (1947).

> *Health is a complete state of physical, social and mental well-being, not merely an absence of disease and infirmity.*

More recent definitions include those of the Schools Council/Health Education Council (**1.1**), the Open University (**1.2**) and that used by the Review itself. In the Review, we have tried to examine health as something other than a 'state' to which people might aspire. For the Review, health is a holistic concept. That is, an individual's self-esteem and decisions are at the core of their feelings of 'being healthy', but other aspects such as age, social conditions and emotions are contributory factors which cannot be ignored.

> *[The aim of the Review is to study] 'those aspects of science that are essential to an understanding of oneself and of one's personal well-being' in the light of 'the historical development and contemporary cultural significance of scientific principles and theories'.*
>
> *(Science Education 11-16,* **1.3**)

This view of health sees the individual as part of a set of systems. The systems need to interact and reach some kind of equilibrium if individuals are to be able to control their own health. Our definition of health, then, is contained in Box 1.

> Health is positive, personal well-being which accommodates to the changing and dynamic continuum of inter-related physical, developmental, social, emotional, economic and political influences on individuals.

***Box 1** The Review's definition of health*

To elaborate on this definition, the factors that contribute to health at age 16 may be different from those that contribute to health at age 50. These factors include our cultural upbringing and expectations, our lifestyle, our genes and the social surroundings of our lives. Nor can we discount the economic and political variables within which we function. Individuals want, as far as possible, to feel that their behaviour in health matters is under their own control.

Unfortunately, we cannot easily control the distribution of resources that affects our economic and social environment. So, this environment, and the political influences which control it, has a direct bearing on everybody's health. For example, the disaster at the Ukrainian nuclear power plant at Chernobyl in April 1986 was an event that may well have profound effects on the health of people in many countries. Different political leaders responded in different ways to this event. In the USSR, people remained in ignorance at first; in Germany, iodine tablets were issued to the population of some cities and people were advised not to eat vegetables or drink milk. In Britain, we discussed the issues openly in the media and took steps such as banning the movement and sale of lambs. Such examples make powerful discussion topics for young people to help them appreciate the power people have — or not — over political decisions which may affect their health.

Teachers' personal ideas about health

Whatever the definitions developed by outside agencies or curriculum developers, everyone has their *own* definition of what it means to be healthy, and we have to start with this in trying to understand ideas about health. (There is ample evidence to show that teachers have their own personal theories of learning (**1.4**, **1.5**), and that these influence the way they organise learning experiences and how they relate to youngsters in the classroom. It makes sense to suppose that the same might be said for health and health education.) Such personal definitions, of course, relate to our personal experiences and might be called our 'personal theories'. Only when we have made explicit to ourselves and then to others our definition of health, and then listened to others' definitions — which may be different — can we define a set of shared goals. However, after the goals have been specified, the further step has to be taken of moving towards them by an educative process called health education.

How can we begin to make our ideas about health explicit? First, we refer to the *Good Health Guide* (**1.2**). This encourages readers to examine their own criteria for health with pictures of various types of behaviour to stimulate ideas and discussion. It then explores several case studies and invites readers to decide, according to their own criteria, whether the people in the case studies are healthy or not.

The Hertfordshire SSCR Working Group (**1.6**) have compiled a workshop pack to enable teachers to consider the skills they might need to convert their ideas of health into effective education. The Group reason that if teachers are going to give youngsters the opportunities to:

> *discuss, reflect upon and evaluate their own personal understanding of key scientific concepts, theories and generalisations* (**1.3**)

then teachers need first to be sure of their own personal theories, in this case about health.

REFLECTIONS

What does being healthy mean to you?
Is there a shared meaning of health among all the members of the science department in your school?
Do members of other departments mean the same thing by 'health' as the members of the science department?

Trials of similar workshop materials have indicated the range of personal theories science teachers have with regard to health. The following theories were produced as a result of collaboration between at least two people during workshop sessions and have been collected over a period of three years. Only the commonest ones are produced here and they are not ranked in any order.

Health is:

- a positive attitude to life, to enable us to enjoy life to the best of our own capability; an awareness of our own and other people's physical and mental abilities, and to be able to cope with a breakdown in any aspect of health;
- a summary of an individual's sociological, psychological and physiological state;
- being able to do what you want to do;
- a state of complete physical, social and mental well-being (WHO);
- the knowledge of and the prevention of behaviour harmful to the body;
- good looks and an absence of illness; a comfortable state of mind and body;
- full functioning of the body;
- a state of being which takes account of the needs of the whole person — the spiritual, physical and emotional aspects;
- an ideal physiological and psychological state of the body;
- mental and physical fitness which enables coping well with all but the most extreme situations;
- physical and mental well-being in which one is aware of oneself, others and relationships with the environment.

Box 2 Further definitions of health

What we hope these definitions do is help readers to clarify their own ideas and to see the range of ideas from which other science teachers operate.

The question we have to ask now is what are the theories held by colleagues, parents, health professionals and, most importantly, the young people whom we teach. What problems are there in coming to terms with other views? Some are outlined at the end of this section in Case Study 1 which is an examination of the ideas of health and health education held by science teachers both within and outside the Review.

Youngsters' personal ideas about health

This is a much under-researched aspect of health education. There are some details about a youngsters' ideas of *aspects* of health, such as what cancer is, or what immunisation means. Some particularly interesting work in this area was done by Dr Anne Charlton, a former biology teacher, who asked youngsters to draw pictures of their ideas of cancer. One of these is shown in Fig. 1. The drawing has a powerful message which cannot be ignored by teachers. It implies that the artist saw cancer as an ever-present shadow lurking to deal out death.

Fig. 1 A child's image of cancer

Such work provides useful insights into the understandings, ideas and emotions children have about cancer. Simply to say (as many teachers do) 'but every good teacher starts where youngsters are' is not enough. Evidence from the Children's Learning in Science Project (CLISP) (**1.7**) tells us that every good teacher does not necessarily start where youngsters are, perhaps because many teachers are unsure where youngsters are conceptually. This may be because they rarely trouble to ask young people themselves. Teachers know where youngsters *ought* to be because, for example, they underwent a course of science last year. But this takes no account of *personal* understandings of previous work. In the field of health education, where youngsters ought to be conceptually takes no account of their *feelings* about health topics, many of which — like cancer — are very emotive.

One teaching approach to immunisation, for example, asks youngsters to make a decision about immunising a young child against whooping-cough. To do this they have to be able to analyse and weigh up all the available evidence, and for this they need to understand complex concepts such as immunity, circulation and risk levels. Thus, making the decision relies on personal conceptualisation of information. That information may be very up-to-date and presented in a humanised way which engages young people, but if their own understandings of the scientific ideas contained in it are not ones that they can confidently use, then positive decision making will be difficult.

Case Study 2 focuses on some of the problems in young people's understanding, taking as an example the common cold.

Finding out what young people think about aspects of health can be done in many ways. Working Groups in the Review have used drawings (as with the cancer example), pencil and paper answers to specific questions and tape-recorded discussion of a problem.

REFLECTIONS

Do you know what health means to the young people you teach?

Does it have the same meaning whatever their age?

What could you do to find out what they think being healthy is?

What implications do their ideas have for your health education teaching?

How would you begin cancer education for the young artist whose work is featured in this chapter?

How do you teach about cancer now?

In the Introduction to the book, the youngsters themselves started by discussing what each of them understood by the term 'an accident' before some of them progressed to investigating different aspects of the accidents in question. An important point was reached in one group when the youngsters began to realise that they were not all talking about the same thing when they discussed their experiences of 'serious accidents'.

Case Study 1
Science teachers' views on health and health education

by Helen Bambrough

Introduction

The findings described here are derived from discussions carried out in 1984 with 16 science teachers in London and Luton.

A holistic model of health education was used in the 1984 interviews; that is, the development of attitudes and skills as well as the acquisition of knowledge was recognised as a valid educational aim. Jenks (**1.8**) described this approach to health education as:

> *a process which can be experienced at various levels rather than an agreed body of knowledge . . . it is concerned as much with ways of knowing as with states of knowledge.*

Science teachers were asked about their concepts of health and health education and about their views on the aims of science education. Because experiential methods are intrinsic to holistic health education, the study investigated science teachers' awareness and experience of informal methods. Their views on the relevance of these methods to science education were explored and they were asked about their willingness to take part in in-service training to develop their expertise in this area.

The views of the teachers

Recent commentaries on curriculum development in science and health education suggest that the relationship between them should be maintained and strengthened because of the similarity in aims and intended learning outcomes, e.g., DES, 1981 (**1.9**), SSCR, 1983 (**1.3**) Bentley and West, 1983 (**1.10**), SSCR, 1984 (**1.11**). In addition, science teachers' concepts of health and health education may be a further barrier to the development of a mutually supportive relationship between health and science education.

Concepts of health

Initial responses to the question 'What do you mean by "health"?' revealed a wide range of definitions. They included concepts of self-esteem, mental well-being, relationships, attitudes and values, coping with difficulties and an understanding of the social and physical environment:

> *It's the well-being of an individual, how you look after yourself mentally, how you can* cope.

> *Health is two things: most importantly it's the self-image children have and their image of how they fit into the world . . . hygiene and sex education are important . . . but it's most important that you look at the attitudes people have.*

> *Health is being able to deal with or control what happens and, if it is beyond one's control, to accept it without too much damage . . . Any definition of health must be almost the same as what living means.*

However, the majority of respondents focused primarily or exclusively on the physical well-being and development of the individual:

> *Health . . . it's the absence of sickness . . . it's physical and mental well-being.*

> *In the context of biology [health] is bringing in relevant aspects of anatomy and physiology — explaining how one can keep oneself healthy.*

> *Health is basically . . . obviously, looking after yourself . . . cleanliness and such like.*

Again, in defining health education, the majority of teachers were fairly traditional in their approach. Definitions which displayed a broader interpretation of health and implied a wide range of teaching approaches were rare.

Concepts of health education

Spontaneous views of health education were based on the study of issues thought to be associated with health. The concept of health implied was not necessarily that originally described — there was sometimes a disparity between a teacher's concept of health and his/her concept of health education. For example:

> *Health . . . if you're going to teach young people how to look after themselves — that includes being socially aware. Health is not just concerned with the individual — it's about groups of people.*

> *(Health Education) . . . a form of preventive medicine and teaching young people to take care of themselves . . . I'd link it with diet and exercise.*

The primacy of physical health was shown in the topics selected for a health education programme. Everyone mentioned issues such as smoking, drugs, personal hygiene, diet and sex education:

> *Health education [gives] a greater understanding of your body and how it can be harmed.*

> *It's teaching kids about physical development.*

> *Health education — it's awareness of your own body, your own environment . . . health and safety and you should really mention fitness.*

Even teachers who had articulate and coherent ideas about the various elements of health and its social, personal and political determinants usually described health education in terms of physical function:

> *Like everyone else, I equate health education with biology . . . understanding how the body works and what it requires.*

No-one initially considered that the development of personal and interpersonal skills was a function of health education. One teacher, who ascribed great importance to high self-esteem and good personal relationships, believed it would be difficult and potentially offensive explicitly to set out to promote these qualities:

> *What you're really trying to do is make each individual student feel that they are worth as much as everyone else . . . I'm not sure you can do that* explicitly *. . . it's almost like having lessons where you say 'Well, you're black but it doesn't matter'.*

A major problem emerged in discussion with teachers of physics and chemistry. Several had great difficulty in defining health education. Long

silences often followed the question 'What does health education mean to you?' A typical response from a physicist was:

> *It's very difficult for us (physicists) . . . we don't teach health education and we come to this cold.*

A chemist replied:

> *This is where you need a list . . . which of these? It's a matter of thinking of something relevant.*

Further exploration showed that several teachers had no articulate views on the subject. Health education had no place in their concept of science teaching and they did not perceive it to be part of their responsibility as science teachers. They, therefore, did not consider it necessary or relevant to develop a considered understanding of its rationale.

> *I don't see that [the development of social skills] as relevant to my sphere of teaching — I would expect it to be covered in other areas.*
>
> *Those sort of skills [social skills] are likely to be taught on courses for fourth- and fifth- years who are likely to go on the dole . . .*

Thus for some science teachers, health education is irrelevant to science education. Others were prepared to include health topics in science lessons only if they were selected according to the criteria of the science curriculum and were taught using the methods normally adopted in the science department:

> *I teach sewage disposal not because of its relevance to health education but because it is a valid scientific topic.*
>
> *What is important is that we teach sex education our way at a particular stage.*
>
> *Health education is tackled by a lot of different departments. We have our own ways of doing it — our own facts to impart.*
>
> *In biology, health education is relevant to topics such as anatomy and physiology . . . I aim to put it across very, very factually.*

The influence of concepts of health education on the content of courses and on teaching style

The teacher's concept of health education has significant implications for its content, its place in the curriculum and the way it is taught. If it is perceived as a body of knowledge about personal well-being and the factors which influence it, science teachers may reluctantly or enthusiastically accept that health education has a place in science education.

> *I would start with the industrial process (of air pollution) and describe the effect that the fumes would have on the atmosphere.*
>
> *I relate our expectations of health to the historical context. I talk about communicable diseases that decimated the population and occupations threatened by certain diseases.*
>
> *[Social skills] Yes, they should be taught . . . it should be put in as a stated aim . . . they should be taught, they are entitled to certain things and not be put off.*

Similarly, they may accept that social and personal skills may be related to health behaviour. However, even if self-esteem and interpersonal skills were regarded as relevant to health, no teacher spontaneously accepted that the development of these qualities should take place in science lessons. Responsibility was seen to lie in other departments, even if positive, enquiring attitudes and good communication skills could be usefully deployed in science subjects.

> *I can't see the scope for teaching decision-making skills in science. I can see that it would fit in very nicely with some of the other schemes we have in school.*
>
> *I don't see [the development of social skills] as relevant to my sphere of teaching — I would expect that sort of thing to be covered in other areas.*
>
> *There's a need for [developing decision-making skills] in science, but I don't think we've got the time for it in biology . . . Those skills can be better developed in other departments.*

There is evidence (**1.12**) which suggests that the majority of respondents do not see health education as part of science education. Only a small proportion of these science teachers referred explicitly to the content or strategies of holistic health education. Most of these were based in primary schools or in other areas of the secondary curriculum. Very few respondents mentioned curricular links with the areas where health education is most frequently taught: English, PE, home economics or religious and moral education. Significantly, Jenks (**1.8**) shows a reciprocal rejection of the science curriculum when she excludes it from her list of areas where health education is well developed.

The exemplars (**1.12**) show that, while some science teachers are developing science courses which embody the aims and teaching styles of holistic health education, they show no awareness of the association between science and health education. Furthermore, several respondents report that their departmental colleagues have reservations about their involvement in 'process' science and feel insecure about using informal methods.

Participants in my 1984 study readily described their lack of awareness and experience of informal teaching styles:

> *I think INSET would be necessary for science teachers to use informal teaching methods. I've seen some approaches to role-play and discussions and realised my inadequacy.*

> *I think science teachers would be prepared to use informal methods . . . but some teachers will not be aware of the range of methods available. I did a three-year training course and I came across a mention of these but I can imagine physicists and chemists who came from University may not have met them at all.*

Conclusions

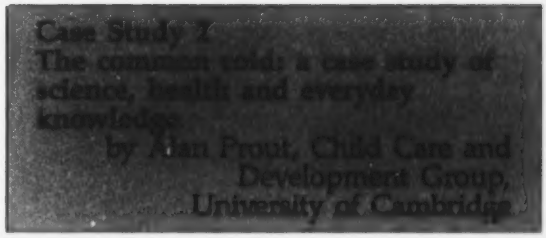
Despite the affinity between holistic health education and process-based science, science teachers appear unwilling and ill-equipped to work in this area. They do not interpret health education in this way and many have no experience or even awareness of the methods associated with it.

Health education cannot promote the development of the skills and attitudes required for process science if it continues to occupy only its traditional slot in the biology syllabus. However, it is now more widely spread across the curriculum and consequently, science education is likely to benefit from the qualities developed elsewhere. Close cooperation between the sciences and the humanities could create a better understanding of the aims and processes of holistic health education.

Training in skills associated with health education is not likely to be seen as a priority in the professional development of the participants in my 1984 study:

> *I think they would be more prepared to do it (INSET) for science than for something which may be regarded as peripheral,the way health education is at present.*

Responses to the SSCR consultation proposals *Approaches to Learning and Teaching* (**1.12**) show that science teachers have links with Craft–Design–Technology (CDT) and Technical and Vocational Educational Initiative (TVEI). Informal methods appear to be more widely accepted and used in TVEI and this is an area of the curriculum with increasingly high status. Perhaps initiatives in this field will provide a fruitful source of innovation in science education.


Case Study 2
The common cold: a case study of science, health and everyday knowledge
by Alan Prout, Child Care and Development Group, University of Cambridge

Introduction

The case study material was gathered by interviewing a sample of 54 15-year-old male and female students from six schools in three areas. Some parents and teachers of the students were also interviewed on a range of health topics. One of these topics was the common cold. The respondents were asked to explore in their own way the statement 'there is nothing you can do to get rid of a cold' and certain pre-defined themes (germs and infectious organisms, body resistance, non-prescribed medication and antibiotics) were followed up by the interviewers. Rating judgements were made on the levels of knowledge displayed by respondents.

The findings are presented under three main headings:

1 What levels of scientific knowledge do students appear to have?
2 How far do they apply this knowledge to health issues?
3 To what extent do they share an orthodox biomedical framework of thinking?

Levels of scientific knowledge

Most students (78 per cent) knew that colds were caused by germs of some kind, but fewer (9 per cent) knew that bacteria and viruses were different from each other. Some knew nothing of germs in relation to colds. Almost half knew that the body had a resistance system of some kind, but only 30 per cent connected this with the bloodstream. One respondent said

> *I think it's white cells . . . [they] all gather round in a big cluster and pounce on them and eat them up.*

On curing the cold, 38 per cent of students knew that cold medications do not cure colds, but over half were unsure of the difference between *curing* and *relieving* symptoms. Very few knew what cold remedies contained other than 'chemicals', and some believed that the chemicals killed off the germs. As far as antibiotics were concerned, three-quarters of the students knew that these were drugs used to treat infections, but none knew that their action was limited to bacteria. Generally, antibiotics were associated with 'serious diseases', and the explanation for their

being available by prescription only was ascribed to their potency. As such they were thought to be 'wasted' on the common cold.

Applying scientific knowledge

Not surprisingly, there were differences in the use of scientific knowledge for explanation between students and teachers. One teacher said when faced with the statement 'there is nothing you can do to get rid of a cold':

> *. . . it's a virus infection . . . the virus is in the blood and multiplying rapidly . . . but if it's multiplying rapidly it needs a certain temperature . . .if you could set about preventing it from reproducing . . . but no . . . not only would the virus reaction be slowed down, so would the antibody reaction.*

Students were quite different. For example, unlike teachers, the majority (70 per cent) disagreed with the proposition. One student explained his opinions by reference to the efficacy of medicines.

> *There is something you can take . . . you buy it at the chemist . . .it claims to get rid of a blocked nose, it does for a bit but then it comes back. Or there's aspirin . . . but you can't take penicillin can you? . . . that's different medicine altogether . . . for your ears . . . (You could also) stay in the house, in bed and keep warm.*

Where teachers, and in particular biology teachers, approached the problem at a sophisticated level of explanation rather than mere description, students began from their own experience, using an everyday working knowledge. Whereas teachers' knowledge and understanding was flexible in its application rather than just a list of appropriate facts, students' knowledge was rough, uncertain and provisional. Their knowledge appeared to come from more explanatory bases — or frameworks — than just biomedical ones, such as the reference to keeping warm and staying in.

Explanatory frameworks

The context in which knowledge operates is often a powerful shaping force for explanation. The research seemed to pinpoint four different bases from which students work when trying to explain the process by which colds are caused:

1 Non-germ theories: exposure to environment or other non-organic factor is the main cause of colds, rather than 'germs'.
2 Germ-only theories: germs are any invading organism. No other factors cause colds.
3 Combination theories: a germ plus disposition, or other joint cause.
4 Separate cause theories: germ theories are held, but at the same time it is acknowledged that colds can also be caused in an entirely different way.

Among the students, only 9 per cent saw a germ as being solely responsible, and 23 per cent saw germs working in combination with other factors, such as getting physically cold or being run down. Eleven per cent saw non-germ theories as the most plausible. 'If you've just had a bath and go out into the cold . . . no, I don't think it's a germ, it's just the weather.' The largest group of respondents (58 per cent) were those who saw germ and non-germ theories as plausible. Some spoke of 'different kinds of colds' caused in different ways. Helman (**1.13**) calls such theories 'the folk model of infection'. He points out that the old adage 'feed a cold, starve a fever' is seen as a consequence of interaction with the environment. If movement from hot to cold places occurs, the low temperature penetrates the body and causes symptoms. Remedies for colds emphasise restoring the balance by replacing the cold experience with a hot one — taking a hot toddy, for example.

In contrast, fevers are caused by germs — 'malevolent little animals'. He points out that people born after 1940 are more likely to see colds and fevers as being caused by germs, having been exposed to the germ theory of disease. However, such knowledge has not ousted the folk knowledge. The theories have simply accommodated to each other.

Discussion

Integrating scientific knowledge into the 'grain of everyday life' is a difficult problem. There seem to be three levels of difficulty.

1 Other, non-scientific, knowledge may exist which has sources of strength which makes it more acceptable and immune to displacement.
2 There may be incongruities between scientific knowledge and everyday knowledge which do not work to the advantage of the former.
3 Scientific knowledge may not be as good at explaining phenomena as its reputation for objectivity and its powerful image would imply.

***Box 3** Reasons for scientific knowledge not being accepted by lay people*

Arnold and Simpson (**1.14**) suggest that new learning of scientific concepts not only needs thorough understanding, but that it is also sometimes blocked by ideas developed in the context of everyday life. These blocking ideas may not be just simple misconceptions, but may belong to a whole alternative non-scientific framework of thinking about the natural world. Students in this study drew their knowledge not from biomedical explanatory frameworks, but

from alternative folk models of infection when asked to solve health problems. This alternative model covers not only colds, but also fevers of the head, thorax and abdomen. Symptoms are related by a powerful determining logic along experiential dimensions of hot/cold, wet/dry. What appears to bind the model together is not an elegant theoretical statement, but a set of cultural practices for dealing with illness — practices which embody the knowledge and simultaneously maintain and reproduce it as taken for granted — not only what *My Mother Said* . . . (**1.15**) but also what she and I do . . . and therefore know.

Finally, it often appears that science educators implicitly assume that even if scientific knowledge does not 'cut with the grain of everyday life' it does at least produce explanations which are the most potent available and which will quite easily displace misconceptions. This has not proved to be so in this study, and may be due to the form school science teaching takes and the congruence of folk beliefs with everyday life. On the other hand, of course, folk theories should not be dogmatically dismissed.

While some illness is demonstrably caused by infection, medical science teaches that other whole-body factors — such as immunological factors and stress — are often involved. Totman's studies on stress (**1.16**) describe the cognitive dissonance that often exists about the causes of viral infection.

SECTION TWO

From health to health education

Health education is a part of the curriculum that everyone, from youngsters to parents and politicians, considers to be important. After all, if we are successful in educating young people in how to stay healthy, we shall economise on health care. What is not so clear is how to go about this. In other words, what is health education?

In this section, we outline briefly four approaches to teaching health education, then we go on to analyse what health education and science education have in common.

Approaches to health education

As Section 1 showed, teachers and young people know what health means to them, but educating other people about health appears to be quite a different matter. Health education is often about such topics as nutrition, dental hygiene and education about drugs and smoking, and whilst we would not deny that the content of courses in health education is important, we think it is possible to overemphasise the content itself at the expense of the process of learning about it. How people learn about health is a relatively neglected subject.

We shall now describe four teaching models where the emphasis is less on the topic (fitness, nutrition, immunisation . . .) and more on the process of education — *how* young people learn. The explanations and diagrams of the first three are drawn from the work of the Hertfordshire SSCR Group (**1.6**).

Knowledge—attitude—belief (KAB) model

This model uses the traditional methods of science teaching and is the one most often found where health education is undertaken by science teachers. The basis is the idea that knowledge about a subject will lead to a change in the attitudes and behaviour e.g. knowing the dangers of smoking will create non-smokers. We all recognise that it does not work that way, especially among rebellious teenagers.

The drawbacks are that the method is directed by the teacher and there is a degree of victim blaming either implicitly or explicitly. Because of the perverseness of youth this may produce the opposite effect to that desired and does not encourage a mature attitude in which responsibility for decisions is accepted by the individuals.

KNOWLEDGE—ATTITUDE—BELIEF MODEL—KAB
Common in science teaching
Knowledge → changed attitudes and behaviour
Teacher directed
Victim blaming

***Box 4** Model 1* (**1.6**)

Personal-development (PD) model

This is the model which we would like to promote. It grows out of the traditional KAB model but moves away from the didactic and victim-blaming approach. The aim is to produce a greater self-awareness and an attitude of personal responsibility for health. This model fits well with the current changes in science teaching and the use of active learning techniques, and so will be familiar to many of you.

It makes use of problem-solving exercises and role play and would include, in addition to the traditional factual material about health topics, a consideration of different lifestyles and the influences of culture and society on health.

PERSONAL-DEVELOPMENT MODEL—PD
KAB framework
Moves away from victim-blaming
Lifestyles
Cultural-societal influence
Self-awareness

***Box 5** Model 2* **(1.6)**

Environmental and political health (EPH) model

In complete contrast to the first model this would rarely, if ever, be found amongst science teachers. It uses an approach to health education based upon a consideration of the legal, economic and social influences on health. This might be the approach adopted where health education was a cross-curricular activity and involved non-science teachers. However, it is more suited to adult education. Its drawback is the constraint on the syllabus since not all topics readily fit into it.

ENVIRONMENTAL and POLITICAL
HEALTH MODEL – EPH
Legal, economic and social
influences on health
Constrains choices

***Box 6** Model 3* **(1.6)**

Model 3 concentrates on the political influences on health. It encourages an understanding of group dynamics and community help groups, as well as methods which can bring about change in the political systems which control finances and resources and their distribution.

Health Promotion

Over the last four or five years, the debate between promoters and educators has been increasing. Health promoters favour the *positive promotion* of health by raising public awareness and changing attitudes. Critics of health promotion see it as little else than salesmanship with little regard for how people *learn* about health issues. Others see such events as the Great British Fun Run as being a way to take positive steps to improve their own health in a way that is fun, exciting and just as much a part of life as going to the supermarket.

The Review's model

Hardly surprisingly, from a collection of educators, there is little of the health promotion model about the work of the Review. What we have tended to concentrate upon is what *science* can contribute to health education.

Science teachers are often called upon to teach many of the aspects of health education, for the simple reason that much of it deals with the human body, and teaching about that takes place traditionally in biology lessons. That alone, however, is not sufficient reason for science teachers to engage in the process of health education.

What do health education and science education have in common?

Health education in schools has come to be regarded in the last ten years of so as being cross-curricular rather than a single subject area. That is, like a multicultural approach to subjects or as antisexism, it is a *context* for teaching rather than a specific subject. One possible consequence of this is that health education comes to be used in schools simply as a context for making other subject matter relevant. For example, one might use, as a way of teaching youngsters questioning skills in personal and social education courses, the role-play material 'A visit to the doctor' (**2.1**), from the Teachers' Advisory Council for Alcohol and Drug Education (TACADE). This would also be a piece of health education, but as a context for another activity.

The question science departments have to ask themselves is: what contribution can science make to health education? Does it contribute only by using health as a context for teaching science so that youngsters see the relevance of their science in everyday life?

The Review's model of health and science education has been fully stated elsewhere (**1.10**, **2.2**). This model was based on the Review's aims for science education, particularly:

1 to study those aspects of science that are essential to oneself and one's personal well-being;
2 to discuss, reflect upon and evaluate one's own personal understanding of key scientific concepts, theories and generalisations.

The case for these aims has been argued elsewhere

(**2.3**, **2.4**). It is clear from these two aims that the Review takes a personal-development approach to health education (see Box 5). For many science teachers, used to operating with a much more medical or knowledge—attitude—belief approach, this model represents a major change. Personal-development models of health education have been criticised in the past for being individualistic, that is making assumptions that individuals *can control* their own health, when in some circumstances, people's place in the poverty trap quite clearly indicates that they are in no position to control aspects of their lives that would lead to healthier living. However, the moves in science education towards an examination of youngsters' *personal* concepts indicate a move in science education much more towards a personal-development model.

What do these two aims mean for health education within science? The first states that science has a contribution to make to youngsters' understanding of how their bodies work, how people respond to others, build relationships and ensure their own physical and emotional well-being. Such a notion goes far beyond traditional biology syllabuses and implies an active understanding of many aspects of personal well-being. To achieve such an aim, science teachers might need to teach the skills of information gathering, decision making, analysing conflicting data and interpretations, forming hypotheses and trying out ideas. They might also need to make young people aware of group dynamics, listening and discussion skills.

The development of many of these skills occurs in several subjects in the curriculum. It would be wrong to assume that science has a particular prerogative to develop them. However, it does have its part to play in giving young people a particular context in which to practise them. Science also has its own particular contributions to make, for example, in developing youngsters' critical faculties when judging the validity of evidence. Enabling youngsters to be critical about causal links between factors with consequences for their health is an important task of science education.

The second aim is crucial. It begins with the idea that youngsters have constructed for themselves an internal world of concepts to explain their everyday external worlds. As we explained earlier, this internally constructed world is used to make sense of new experiences and as the basis for decisions and actions. The most effective way of enabling youngsters to make positive decisions is to start with *their* personal concepts, even if they are different from those the teacher is finally working towards.

To summarise, then, there are two major contributions that science can make to health education. The first is to help young people develop competence in the *use* of scientific ideas, because only when youngsters are confident enough of their understandings to *use* them do they become an effective basis for positive action. The second is to help youngsters to develop competence in the skills of relationships, analysing, inferring and decision making, for example, that are important features of both health education and science education. Young people need to be made aware that such skills can be applied to decisions about their own health. This can be done by contextualising science teaching in the health experiences with which youngsters are familiar and which are relevant to them. We believe that until youngsters have developed personal concepts of health issues which are not clouded by myths, fear and lack of experience of others' ideas, they cannot 'know' about health in such a way that they can use their knowledge for positive action.

Do health issues rely, then, only on understandings of scientific concepts and the ability to use them? No. The Review says (**1.3**) that youngsters should have the opportunity to:

> *explore topics or themes which exemplify the limitations of scientific knowledge as an explanation of the human condition.*

We all understand that some aspects of the world cannot be explained by scientific methods. Science education for the most part has left the explanation of the social and moral implications of the findings and methods of science to others. We are saying that science educators have a responsibility to make young people aware of the limitations of science. This has two implications for health education in science lessons. Science teachers need to know what contribution other subjects are making to health education, and they need to understand and point out the limitations of science in questions of health.

Some examples of the limitations of science applied to health are:

- the use of Jenner's discovery of vaccination to explore the ethical problem of whether the technique should have been tested on human beings;
- the ethical aspects of the use of animals in the testing of drugs for human beings;
- the patient deaths resulting from over-enthusiastic use of Lister's discoveries about the effects of antiseptics.

***Box 7** Limitations of applying science to health*

REFLECTIONS

Are the moral and ethical dilemmas of health and science a planned part of your science curriculum?

Do you enlist the help of other departments such as drama when dealing with such issues?

What other limitations of scientific explanations of the world would make an interesting study for young people?

Does teaching about limitations pose a threat to the future image of science as an authoritative body of knowledge?

An example of aspects of health education and science education

In the Introduction to this book, the two groups of young people were exploring through the medium of science their understanding of data about accidents. The first group discussed the limitations of science. They were searching for an answer to the question of what represented scientific evidence and whether some data were more useful than others. This seems to us to define an important health education issue: which assertions can be relied on? How can people discriminate between the claims of different agencies about products and practices which affect health? Is a piece of research necessarily more valid because it has been conducted with a large population? How can one validate personal experiences, such as the taped evidence to which the group refer, in science? The children's discussion also touched upon issues of scientific methodology — were their questionnaires reliable, for example? The first group's discussion illustrated many of the problems of data analysis, presentation and interpretation that face people in their attempts to relate information about health to their personal well-being.

The second group attempted to test out their own theories. Their discussion illustrates the notion of shared meanings for a concept. The refinement that they may have to make to their experimental tests in the light of establishing a common 'standard' for 'serious' accidents opens up a whole wealth of possibilities for exploring how such standards are established in other scientific experiments — safe dose levels for radiation, for example. The attempts to control variables such as type of polish, number of applications of polish, type of floor covering and the students' understandings of force, mass and friction were all good examples of the practice of science. They were, however, enacted in a problem-solving situation which had relevance for young people in applying safety standards in their own lives.

The learning environment and learning

Finally, an important factor is the environment for learning which young people experience. In our introduction the youngsters were treated with respect as co-learners by the teacher. There were parts of the lesson where, by virtue of their own investigations, they were the experts who reported their findings to their peers. This feeling of expertise does much to build young people's self-esteem, helping them towards competent use of their ideas. For the Review, the learning environment which best promotes this was described in *Towards the Specification of Minimum Entitlement: Brenda and friends* **(1.11)**:

> *A school needs to provide a supportive climate for teaching and learning and to create an ethos in which overtly stated principles are in keeping with the everyday events of school life. Thus the school should operate a system of agreements regarding the learning environments which is reached jointly with parents and students and which protects the younger and more vulnerable individuals.*
>
> *For many students learning is most effective if it can be seen to be relevant and relevance is related to personal experience and aspirations. Thus the school should engender a caring atmosphere in all its activities in order to support and enable personal development. The school should encourage young people to become involved in decisions concerning their own learning needs, giving them direct experience of the responsibility which is necessary for their development as self-reliant and self-directing adults. This means the provision of:*
>
> - *a sensitive learning environment that allows the confident expression of individual needs and aspirations and where students are given and can accept praise from their teachers and peers for their achievements openly and without embarrassment;*
> - *adequate time for students and teachers to talk and share ideas;*
> - *opportunities for training in interpersonal skills, including that of valuing the opinions and ideas of others;*
> - *an operational plan for individuals' learning experiences which at each stage takes accounts of the students' earlier experiences;*
> - *appropriate mechanisms for the negotiation of activities that are additional to the minimum entitlement.*
>
> *There should also be an understanding that the student's view of progress through courses is as worthwhile as those of teachers and parents.*

Clearly this has important implications regarding the form and nature of assessment and reports.

What of *how* young people learn? How can such active learning be promoted? The most fundamental factor is starting where the pupils are. From there the next steps might be as shown in Box 8.

If pupils' own ideas have been shown to be insufficient to explain events, then reconstruction may be necessary. However, even in the face of what might appear to be overwhelming evidence that an idea will not fit the circumstances, many people still cling to their personal theories.

- Help pupils to make explicit to themselves and others their previous knowledge and ideas on the topic area.
- Provide opportunities for pupils to explain to others their reasons for holding their ideas and theories.
- Encourage discussion, and comparison of their own ideas and theories with those of each other and the teacher and with orthodox ones introduced by the teacher.
- Allow testing out of their ideas, practically or by further discussion, or alternatively by seeking evidence from the research and writings of others.
- Encourage discussion of results to help young people reconstruct new ideas and theories formed as a result of the testing out.

***Box 8** How to help young people learn*

SECTION THREE

Health and science education — what do we teach?

Traditionally, the question of what we taught referred to the content of a course. We need to consider, however, what we mean by the word 'content'. The Curriculum guide, **Better Science: Choosing content** suggests that content should mean the *concepts, skills, processes* and *attitudes* of any course. In other words, it has a wider meaning than just the ideas and knowledge that youngsters gain. We shall use this definition of content in this section, where we shall examine what contribution science might make to a course in health education. First we shall look at what teachers and others feel is important in health education, in terms of knowledge, skills and attitudes. Then we shall go on to examine health education in detail, drawing up suggestions for what might be included at various stages of a five-year health education course. Finally we shall examine one topic in health education — nutrition — in detail, to see what contribution science education might make to this.

Health education and science courses: content

What do teachers think ought to be taught in health education? Table 1 shows the results of one survey showing which subjects teachers judged to be essential or important elements of health education courses in schools.

These views reflect a wider perspective than that covered by the science curriculum. However, we are primarily concerned with aspects of science education. The Curriculum Guide **Better Science: Choosing content** describes topic areas that we feel are essential components of an 11—16 science course.

The HMI document *Matters for Discussion: Health education 5–16* **(3.1)** quotes the following areas as being important for health education:

In the primary phase the youngsters should have gained an understanding of:

- *the human body: names of parts and ideas of normality in physique;*
- *conditions which promote healthy growth and development;*
- *health hazards: obesity, smoking; alcohol; dental caries and diet;*
- *safety;*
- *services for community and health care;*
- *social conditions which contribute to health;*
- *interdependence of people and other living things;*

In the secondary phase:

- *knowledge of physical and emotional development;*
- *knowledge of how to pursue healthy ways of living;*
- *knowledge and understanding of the changing patterns of disease and the links with social*

Primary schools			Secondary schools		
	% Ess.	% Imp.		% Ess.	% Imp.
1 Safety and first aid	71	25	Personal health, body management, human biology	81	16
2 Personal health, body management, human biology	56	39	Relationships	69	27
3 Environment and health	47	47	Growth and development	66	29
4 Food selection	34	57	Safety and first aid	48	45
5 Relationships	31	50	Food selection	45	45
6 Growth and development	25	52	Education for parenthood/adulthood	45	46
7 Education for parenthood/adulthood	17	42	Environment and health	32	60
8 Community health	7	41	Community health	18	69

Scale used: (1) Essential, (2) Important, (3) Not important

Table 1 *Ranking of topics as 'essential' or 'important' to school work* (**3.2**, p. 18)

progress and medical advances;
- *increased knowledge about people's interaction with the environment;*
- *understanding of ethical issues such as test-tube babies;*
- *knowledge of the welfare services;*
- *elementary knowledge of first aid.*

Skills in health education

Several Working Groups of the SSCR have prepared lists of skills and processes which they feel should be taught if all youngsters are to have a broad, balanced course in science up to age 16. Many of these skills are also ones which youngsters require if they are to make choices about personal health. (The reader should note that details of the Working Groups are contained in Arches (**3.3**).)

The work of four such groups — Hampshire (*14–16 skills-based science course*), Wolverhampton (*Teaching basic skills through science*), Avon (*Science for half our children*) and Cheshire (*Cheshire achievement of scientific skills in school*) — has been combined to produce the list in Box 9. The groups produced remarkably similar lists, but some groups such as Wolverhampton and Avon concentrated on particular aspects of science, such as communication, giving their lists a wider basis.

- observing
- manipulating
- measuring
- recording
- carrying out experimental procedures
- making inferences and interpretations
- reporting
- applying
- social skills
- study skills

Box 9 *Skills to be attained by age 16*

Which, if any, of these skills contribute to health education? If the purpose of teaching the skills is to help young people understand and use scientific concepts, then they all do. However, some may be of greater importance to health education than others. If we want young people to read, analyse, interpret, question and perhaps act upon information from a variety of sources which may present conflicting views such as those of doctors and food manufacturers, then some of the above skills are particularly useful. These are: observing, making inferences and interpretations, reporting, social skills, study skills and skills of applying information to novel situations.

The HMI document (**3.1**) quotes the following skills as being important ones for teachers of health education to encourage at the secondary stage of a young person's school life.

> *Pupils should know how to distinguish between fact, promotion and polemic and how to weigh and interpret information and evidence about health from a variety of sources. That is, they should be able to analyse data in table form and in simple graphs; comment critically on health-related material; be able to locate information which relates to health and safety and to personal lifestyles and have acquired the knowledge base and developed the confidence in themselves to begin to make choices about health based on evidence.*

We would go somewhat further than this. In helping young people to learn the skills of decision making, we need to take into account not merely the analysis of mathematical and pictorially

presented data, but also the ability to analyse communications presented in words as well. Much of the information that youngsters meet about health will be in a non-graphic form. Analysis of the value of others' arguments is an important skill which science can help young people to master. Other important scientific skills include analysing evidence and understanding what constitutes validity and reliability in evidence. In (**1.11**) the Review outlined a series of process skills which would provide a useful basis for young people who are faced with making decisions which affect their health. These are listed in Box 10.

Communicating and discussing which include
- thinking
- questioning
- seeking help
- negotiating

Processing information which includes
- selecting
- using relationships
- controlling and interacting variables
- designing
- drawing conclusions

Problem solving, experimentation and decision-making which include
- predicting
- inferring
- formulating hypotheses
- interpreting
- modelling
- evaluating
- assessing
- classifying
- managing time

***Box 10** Useful process skills*

Values and attitudes in health education

What other aspects of science might relate to health education? The attitudes that young people hold towards their health are important. We would wish to encourage them to regard health positively, and to see their own health as something over which they can exercise some control by their own decisions. In (**1.11**) the following attitudes which science education ought to foster in young people are suggested (Box 11).

- open-mindedness
- self-criticism
- independence of thought
- responsibility
- perseverance
- cooperation
- scepticism
- desire to be well informed
- confidence
- respect
- willingness to be involved
- sensitivity
- enthusiasm
- tolerance
- persuasiveness
- questioning
- trust

***Box 11** Attitudes to be aimed at by age 16*

Health issues: their place in science courses

We wish to stress that this sub-section consists of suggestions only. In our view, the only people who can make decisions about what is contained in health and science courses are the teachers, parents and young people themselves.

According to *Health education 5–16* (**3.1**), young people should enter secondary schools equipped with knowledge about their body and the conditions which promote its health, some health hazards, some health services and the interdependence of living things. This is the starting place for science teachers, and there we would suggest that the lower-school science classes might explore the topics in Box 12, and the upper-school science classes those in Box 13.

1. Cells and their growth, normal and abnormal, as an introduction to cancer education.
2. The development of secondary sexual characteristics *only* (as part of a planned school programme of sex education).
3. Risk-taking relating to, for example, safety education and education about substance abuse (this includes smoking). Case Study 4 indicates that the first year is the best time for this, and a cross-curricular approach might well be considered.
4. Bacteria as an introduction to ideas about germ theory.
5. Relationships in their working groups in science as an introduction to the skills of cooperation.
6. Interpersonal skills such as listening.
7. The relationship between energy and food–exercise
8. Environmental effects on health such as local pollution trails.
9. Food choices and additives.
10. Immunity systems and the arguments for and against immunisation, in preparation for pupils' BCG and rubella inoculations.

***Box 12** Health topics for lower-school science classes*

1 Sexual development and sexual relationships from the physical, emotional and moral angles. We believe that these aspects should not be separated. Biological aspects of sexuality can only be taught successfully in the context of responsibility. Such courses should seriously consider the inclusion of heterosexual and homosexual relationships; contraception; sexually transmitted diseases; pregnancy and birth; child and foetal development; and gender-based politics in different societies.
2 Changing patterns of disease and the history of medical progress.
3 Cancer education through a further study of cells. (Studying disease patterns could provide an excellent opportunity for practice in data analysis, and the different incidence of diseases in different countries provides an opportunity to look at a scientific topic within the context of other cultures.)
4 Medical technology, its benefits, socioeconomic cost and alternatives to it.
5 Ethical issues raised by technological advances in medicine.
6 Environmental hazards to health and their prevention.
7 Further studies on safety, including the rudiments of first aid.
8 Patterns of epidemiology (applications of data analysis).
9 Dental health.
10 Nutritional needs of different groups.
11 Relationships between aspects of physical and mental health and health hazards such as smoking, alcohol, obesity and drugs.
12 Societal arrangements for continuance of health such as cancer smear tests, blood transfusion services, well-women clinics, Sickle-cell Anaemia Society, etc.
13 Interpersonal skills such as negotiating, listening, discussing, questioning and confronting.

Box 13 *Health topics for upper-school science classes.*

A special case: nutrition

We refer readers to the Curriculum Guide, **Better Science: Choosing content** which suggests topics in nutrition which science teachers might teach to 11- to 16-year-olds. It is in that context that we examine possible contrasts between the general recommendations of health educators and the practice of science teachers.

In Table 1 at the begining of Section 3, secondary teachers ranked food selection fifth in importance for inclusion in a health education course. Forty-five per cent of the respondents saw its inclusion as 'essential'. The report outlined food selection as including nutritional needs, eating habits, preparing meals, food additives, food advertising, keeping food clean and food and dental health.

All this evidence, however, relates to *teachers'* views. If science courses are to be relevant, *youngsters* must see nutrition as an important area to be covered in school. Evidence from *Just a Tick*, the health topics questionnaire by John Balding of Exeter University (**3.4**), indicates that youngsters regard nutrition as important, too.

A study carried out by an SSCR Working Group indicates that some first- and second-year young people do not see learning about aspects of nutrition as science. In the work done by the Cumbria nutrition group (see Case Study 3, below), youngsters were asked whether what they had learned about nutrition in the project was useful to them in their classwork generally. None of them mentioned science as an area where learning about nutrition was important. This was despite having been shown a science experiment in their nutrition education programme! It is clear that teachers need to construct more effective strategies for the transfer of learning. Many health educators appear to share these youngsters' views.

Publications such as the Schools Council/Health Education Council Project 13—18 (SCHEP)(**1.1**), the Open University's *Good Health* (**1.2**) and the Health Education Council's *My Body Project* (**3.5**) list the most important aspects of nutrition education as including nutritional needs, eating habits, food additives, food and dental health, food preservation and choosing food. If we compare this list with the suggestions of the Review Working Groups in science, we find that they have in common *nutritional needs, dental health* and *food preservation*.

Science courses also frequently feature food tests as being an important part of learning about nutrition. We would argue that although such chemical tests may be an important feature of science education, they do not of themselves contribute to nutrition education. It may well be that while science teachers consider such topics to be relevant, young people find it difficult to relate doing chemical tests on food to the everyday choices they make about balancing their diet. Therefore, science teachers, in contributing to nutrition education, need to take into account young people's needs and how science can help them to make positive choices.

In terms of health education the important skills for young people are those of making decisions rather than conducting tests to 'prove' that the nutrition tables they use are correct. We would urge science teachers to examine their aims in nutrition education carefully.

Case Study 3
Chips with everything: Cumbria nutrition education and school meals project

by Norma White, Health Education Support Scheme, Barrow Teachers' Centre

Health education is an item within the school curriculum which frequently requires cooperation and coordination across several subject areas. Moreover, it often requires coordination with a range of non-educational personnel, as is exemplified in the connection between nutrition education and improvement schemes for school meals.

Teachers and other professionals have become increasingly dissatisfied with the excess of fat and sugar and the low fibre content in school meals. Many teachers in Cumbria were frustrated at working hard to encourage sound nutritional habits on the one hand yet seeing unhealthy food regularly served for school meals on the other. It seemed timely to try to coordinate a scheme between the catering service and teachers to try to facilitate change in school eating habits.

After lengthy discussions with the catering service, it became evident that making a profit was necessary to their survival. Chips, burgers, hot dogs and sweet-course items were the main source of that profit — the last having at least a treble mark-up price. The catering service were afraid of a change to healthy foods driving pupils away. This is where education plays an important role and needs to be coordinated with the catering service's provisions so that cooperation may promote change, and healthy eating habits and the availability of healthy food may become mutually reinforcing. Eventually, the catering services agreed to a pilot scheme being carried out in Thorncliffe School, Barrow-in-Furness, concentrating on first- and second-year pupils.

The discussions which took place with the catering service were crucial in the preparation of the scheme. Initially all first-year pupils were asked to suggest foods they would like for school meals. To our delight the catering service said they presented no problems because all were already on their lists. However, they asked for a trial period of three weeks using 12 pupils and changing each week. This was pleasing for it gave the school the opportunity to monitor progress.

The school had two main objectives. One was to encourage healthy eating in all pupils, and the other was to try to change eating habits in those pupils taking school meals.

Throughout the term prior to the start of the scheme, the home economics department concentrated its teaching on food groups and the importance of balance and variety in the diet. During the three weeks before the commencement of the scheme, a separate educational process took place — peer-group tutoring.

All fourth-year pupils in the school study various health topics of which healthy eating is one. Some pupils also have biology and home economics. Four such girls, who were also artistic, prepared a 20-minute illustrated talk for their English lesson called 'Food, glorious food — or is it?' Their inspiration came from a variety of subject areas. These girls agreed to adapt their talk to suit younger pupils and to present it to them in tutorial time. They cut the length and adjusted the vocabulary and scientific content. They felt that rather than use the time explaining how the digestive system processed, say, fat, they would concentrate on the possible consequences of eating too much. They also demonstrated an experiment showing the action of Cola and brown sauce on dirty tarnished coins and discussed the possible consequences for the human digestive system. The girls presented this talk to all first- and second-year pupils, and also answered many questions. The exercise was demanding for them but they enjoyed it and felt they knew and understood the topic better as a result of their teaching experience. The younger pupils also said that they had benefitted from this kind of teaching. Some said they were prepared to do the same themselves some day.

An illustrated talk was also presented during this period to first- and second-year groups by a member of staff. Pupils and staff cooperated throughout this phase, making sure that all aspects of education were complementary and not repetitive.

In the week before we began coordinating with the catering service, we questioned all pupils eating a school meal on various aspects of their meal, and recorded their replies.

The special cook provided staff with menus a few days in advance and the pupils with a leaflet from Tesco, on high-fibre foods. In tutorial time, staff worked with pupils trying to help them choose meals, remembering balance, variety and cost. Taking all of these into account in the large throughput of the school canteen is an arduous task for pupils. It is further complicated by inadequate displays of menu items. Following each meal the pupils were asked about it in relation to size, cost, food eaten and desirability from both a health and a flavour viewpoint. The cook also questioned the pupils.

After three weeks, all pupils moved on to the revised menu and three weeks later they were asked the same questions as at the onset. The results showed that eating patterns had changed and there was enough evidence to suggest that if pupils are given the opportunity they will choose a more healthy diet. For example, chip consumption was cut by half, cakes and puddings by half and hot dogs by two-thirds. Salads and salad buns were to be in real demand and wholemeal

flour was used throughout. What is more, the profit margins were acceptable to the catering service.

Two other interesting aspects of this pilot scheme involved the tuck shop and parents. Pupils working in the tuck shop agreed to sell more nutritious foods such as nuts, raisins, fresh fruit and drinks, realising that their profits would be adversely affected by ceasing to stock unhealthy foods. To compensate they have since diversified into stationery products. Parents were involved from the beginning when they received a letter explaining the ideas and plans of the scheme and asking them to read the relevant pages on nutrition in a *Look after yourself* booklet with their child.

Coordination requires time, patience, imagination and inspiration. Its compensations are interest, development, progress and increased harmony and understanding.

SECTION FOUR

Where does health education take place?

In this section we look at the examples of how health education is managed in the framework of the whole school curriculum. The first sub-section examines what we mean by ideas of coordination in a whole-curriculum perspective. Then, we briefly describe three models of coordination of health education in secondary schools, and continue by making some suggestions as to what science departments might do to contribute to each of these models. We finally describe our preferred model for coordination of health education and a set of recommendations for putting it into practice.

At the end of Section 4 there are four case studies: Case Study 4 describes the role of the health education coordinator in developing health education across the curriculum; Case Study 5 is about cross-curricular cooperation in a week-long project on smoking education; Case Study 6 describes the introduction of a coordinated health education programme in a large secondary school; and Case Study 7 describes one way of setting up a health education planning team in a school.

A whole-curriculum perspective — aspects of coordination

The HMI Document *The curriculum from 5 to 16, curriculum matters 2* (**4.1**) has the following to say about health education:

> *There are some essential issues which are not necessarily contained within subjects but need to be included in the curriculum. While they may sometimes be taught separately, they are more frequently and often more appropriately mediated through topics, subjects, groups of subjects or the general life of the school. . . . Whatever the arrangement for cross-curricular issues, they should not be left to chance or to individual initiatives; their place needs to be assured through consultation, be consistent with the general framework adopted by the school and be recorded in schemes of work which indicate the progression to be expected* (**4.1**, p.13)

Methods for achieving such coordinated policies have been explored in great detail in the Schools Council's very useful *Developing Health Education: A coordinator's guide* (**1.1**).

One of the most important first steps in any plan to coordinate activities is to decide what is meant by 'coordination'.

By coordination we mean:

> *the act of planning and arranging aspects of a youngster's learning experiences so that they work together efficiently and harmoniously. It includes the careful arrangement of resources of time, equipment and teaching approach as well as agreeing the common goals of concepts, skills and values being learned so that youngsters have a coherent experience of which they can make sense.*

REFLECTIONS

Does coordination of health education occur in your school?

What is the underlying principle of that coordination?

Is it time, content, economy of resources or something different?

Who manages it?

What part does the science department play?

What are its strengths and weaknesses?

Coordination, then, is a complex business. It involves not only the bringing together of different perspectives on a particular topic, from, say, both English and home economics, but also the controlled use of resources and the integration of different teaching methods.

The last point is an important one. Over the last decade, health educators in schools have tackled

the problem of coordination in two ways. First they have chosen to use a wide range of teaching approaches in engaging youngsters in learning. Secondly, they have begun to work from the psychological viewpoint that youngsters' self-esteem makes an important contribution to their health. Consequently, the approaches and curricular materials developed within health education tend to emphasise experiential, participative learning by youngsters. This move towards youngsters being much more self-directing and more in charge of their own learning has, in the experience of some of our working groups, proved to be difficult when taught alongside more traditional approaches. For example, some youngsters and teachers find that learning methods which are more active, whilst fruitful for them, can sometimes cause friction with other members of staff who are using traditional and perhaps didactic methods of teaching. Thus, coordination, as well as being complex, is an activity which needs a great deal of sensitive development within a whole-school context.

Some curricular models for coordinating health education in the context of the whole curriculum

The *Health Education in Schools and Teacher Education Institutions* report (**3.2**) invited respondents to say how they thought health education should be organised in the curriculum. The results are shown in Table 2 below. This information tells us how most schools organise their health education programmes. Those who have organised such a programme, seem to have done so in one of three ways:

1 as a separate timetabled subject;
2 as part of a planned course of personal and social education (PSE);
3 as a coordinated programme of specialist subjects.

We shall examine each model in turn and present some suggestions for science departments operating within each of these frameworks. Each set of suggestions has been written in a hierarchical way from least to most personal involvement of staff.

Health education organised as a separate timetabled subject

In this type of organisation, the teachers of the subject may be health education specialists, or members of staff who have other subject specialisms and an interest in health education. The course may be taught to all years, or only the first three before option choices occur. Sometimes this approach is used as a strategy for overcoming the problems caused by option systems in the fourth and fifth years when the experiences of youngsters differ, and planning health education as a coherent experience presents problems. We make the following suggestions for solving these:

- Careful liaison between the science department and the teachers of health education is essential. One of the major contributions that

		% Strongly agree	% Agree	% Don't know	% Disagree	% Strongly disagree
(a) A separate and distinct timetabled subject	Primary	3	8	8	52	10
	Secondary	8	12	7	38	14
	Both	4	9	8	50	10
(b) Part of existing subject areas	Primary	24	55	2	3	1
	Secondary	24	40	2	10	2
	Both	24	53	3	5	1
(c) Part of a more widely based programme of personal/social education	Primary	11	36	11	16	2
	Secondary	40	30	4	7	1
	Both	16	35	10	15	2
(d) As combination of (b) and (c) above	Primary	15	32	10	13	2
	Secondary	30	26	7	11	2
	Both	17	31	10	12	2
(e) No matter how organised there should be a planned programme for all pupils	Primary	20	45	7	10	1
	Secondary	52	30	2	1	1
	Both	26	42	6	9	1

Table 2 *The organisation of health education in schools* (**3.2**, p. 21). *Ranking of responses from schools to statement relating to the way in which health education should be organised*

science teachers can make to health education is to help youngsters become competent users of ideas about health, in the context in which they learn about them. Those responsible for health education courses in the school can plan and organise their work better if they know the aims of the school's science courses, the resources available in the science department, and how and when topics associated with health are taught. This might initially be done by exchanging detailed schemes of work.

- Representation of the science department on the planning team for the health education course is necessary. In this way, the members of the department can make suggestions in person. This will help the representative, and subsequently the rest of the science department, to understand, by discussion, the aims, objectives, planned outcomes and philosophies of the course. It will also help in science department planning, since a full understanding of what is being taught elsewhere in the school, and an opportunity to contribute to it, might enable the department to delete sections of the science syllabus. Or it might give the science department the opportunity to examine a different aspect of the topic, for example the technological or the historical, the basics having been dealt with elsewhere.
- The attendance of the health education director of studies at science department meetings is advantageous. This reciprocates the preceding suggestion. It enables the health education teacher(s) to discuss the aims of science courses and to develop a better understanding of them.
- Some team-teaching of health education and science education can be planned. This would enhance the skills and understandings of both sets of teachers, and give the youngsters a broader viewpoint as well as a real context for their science. Planning for this might be at several levels. It might be that if the timetable does not permit actual team-teaching, only temporal planning is possible. That is, arrangements are made to teach topics at the same time, each subject building upon the youngsters' experiences in the other lesson. For example, youngsters could be set problems to solve in science which have arisen as a result of discussions in health education lessons. Or, discussion of moral and political issues which have arisen as a result of a piece of science work can take place in health education.
- A member of staff from the science department can share the teaching on the health education course. This also brings enormous advantages in terms of cross-curricular planning. Giving science teachers a different context in which to teach may well have the advantage of making science teaching more meaningful for the youngsters. It may also be of benefit to science teachers, because it helps them to learn new teaching methods. Some teachers in Review Groups, who have been nervous of experimenting with techniques such as drama and role play, have enjoyed learning in this way. They found it helped them to distance themselves from science and make their mistakes in a context where they felt their 'expert's role' was less obvious. They developed the confidence to try the techniques in their science lessons.

Health education organised as part of a planned course of personal and social education (PSE)

Often this approach designates a tutor period for every year group in which the personal and social education course is taught. Alternatively, the tutor period is part of a wider course which includes other areas of the curriculum and has additional timetabled 'slots' of its own. Exchange of information is essential if the course planners are to refer to what is happening elsewhere in the school. These courses usually involve pastoral staff who have attended recognised training courses in personal and social education. Such courses often develop separately and more or less ignore the traditional academic subjects. The planned courses of this kind would encompass far more than just health education.

This framework for the organisation of health education has been found to be particularly difficult for science departments and we make the following suggestions which may help them to overcome this:

- Arranging a special science department meeting for the course director of PSE is often helpful. Inviting the course director to look over the schemes of work and health education resources available in the science department can be helpful. The director can then explain the philosophy and planning of the personal and social course to the department and the meeting can plan how contributions and cooperation might take place.
- Members of the trained team of PSE teachers can be invited to give the science department some in-service training in different teaching methods.
- A member of the science department can be an independent observer at planning meetings of the PSE team. If a great deal of the PSE takes place in tutor time, members of the science department will be involved directly

in the teaching and planning. This involvement can be increased by having department members do some writing of course materials for PSE, from the viewpoint of 'experts' in science, biology or technology.

- Tutors from different years who are members of the science department might examine the science teaching schemes from the viewpoint of PSE tutors. This is often useful in making suggestions as to how science departments could cooperate with PSE, for example, by changing the timing of teaching a topic, or modifying the methods or even the content, so as to draw upon the experiences youngsters have in their tutorial lessons.
- The tutors in the science department can report back to each year planning team for PSE on aspects of science. If decisions to change science lessons are made it is important that these are reported to the PSE team, to allow them to build on the youngsters' new experiences.
- It is helpful if every year group and a primary liaison link person is represented within the science department staff. This may mean a fair amount of planning so that, for instance, the science department has a tutor in every year group. This will increase the probability of the youngsters having a coherent experience in every year, and ensure a clear flow of information between the science department and PSE teams.
- A member of the science department should be sent on one of the training courses for PSE staff. This needs to be followed up in the department by setting aside time for the rest of the department to learn from them, preferably in conjunction with another trained member of the PSE staff.

Health education as a coordinated programme of specialist subjects

In this type of course coordination is particularly crucial, as there is no timetabled time devoted to the subject, and there may or may not be tutorial time allocated in the school. Health education is taught entirely in the context of other subject areas as it arises in their syllabuses.

Since coordinated health education draws only on subject contributions, our working group experiences have shown it to be the easiest framework in which science departments can make a contribution. However, conversely, it has also been shown to be the method of organisation which makes the greatest demand for change, particularly in teaching methods, if health education by science teachers is to be effective. Some suggestions for contributing to this system are given as follows:

- Careful liaison with the health education coordinator in the school is essential. As we have mentioned in the other two examples this is an essential first step in ensuring full cooperation and understanding.
- A member of the science department should be on the planning team for health education. Once again, this helps information to be accurately disseminated, and the aims of each aspect of the curriculum to be thoroughly discussed and understood.
- A survey of what the science department already contributes to health education should be conducted. This refers not only to which topics are taught, but more importantly, how and when they are taught (there is an excellent grid to help in this task in **1.1**).
- A special series of health education sessions at science department meetings could be organised. These should enable the science department representative on the planning team for health education (and preferably the coordinator) to report on the plans for the term or year ahead in the health education course, for example to discuss which films are planned or what visits and visitors have been organised.
- Every member of the science department staff should be involved in planning how they can broaden their teaching approaches to make an effective contribution to health education. The results of this piece of reflection need examining carefully at a science department meeting. It may be that many members do not have to change or do not want to. This is obviously an issue for sensitive discussion.
- It is important to know what other departments do. The home economists can be asked to explain how they teach nutrition, for example, and more importantly, why they choose to do it that way. The drama department, whose expertise may be considerable, may be used to teach role play or how to handle discussions.

Conclusion

Our definition of coordination (see 'A whole-curriculum perspective – aspects of coordination' at the start of this section) requires that activities and learning experiences be planned so that youngsters have a coherent experience of which they can make sense. In Section 3 we pointed out that science had important contributions to make to youngsters' concepts, skills and attitudes to health. Thus all three models outlined above have implications for the science department if young people are to have a coherent learning experience in health education. The overwhelming implicat-

ion for all science departments, no matter which method is used, is that science teachers must begin to liaise with their colleagues from other departments to share teaching expertise, resources and materials and to gain some idea of the different experiences which young people have.

REFLECTIONS

Which of the three models operates in your own school?

Draw up a list of the implications for the science department of full cooperation with a health education policy.

How would you persuade the health education coordinator in your school that the moral and ethical issues of sexual relationships should be taught in the science department along with the biological aspects?

Do you think you could/should teach such issues in science?

The science department's contribution to health education — a preferred model and some recommendations

The science department can contribute to health education in the school in two ways:

1 by being involved in the overall planning level of the school's health education programme;
2 by supporting the school's health education programme by good practice in teaching health education in the context of science.

We shall start by making recommendations for a whole-school organisation.

The whole-school framework

We have presented three possible models for co-ordinating health education in a school. The model a school chooses will obviously depend upon many factors. Because we believe that science is an essential part of health education, we prefer a model in which the school science department has a valued role.

Thus, the recommendations that follow (nos 1-10 in Box 14 and its continuations) are to enable a model of coordinated health education which is a hybrid of two of the models we have described. That is, health education occurs both within a personal and social education context such as tutorial time, *and* as coordinated and supportive teaching within subject departments. The contributions of all the partners in this exercise are planned so that all youngsters receive a broad and balanced curriculum throughout their 11 years of schooling whatever their options are in the last two years. Such a broad, balanced input can only be achieved by means of a school health education policy.

Recommendation 1 That schools establish a team of people to draw up and operate a policy for coordinated health education.
Recommendation 2 That schools provide opportunities for the team to explain their policy to the whole staff.
Recommendation 3 That schools publicise their policy widely with pupils and parents and seek feedback on it.
Recommendation 4 That schools ensure that the health education team is represented on the curriculum planning team of the school and that the policy for health education is an important part of that planning.
Recommendation 5 That schools ensure regular access to professional development in-service for members of the health education team.
Recommendation 6 That schools provide opportunities for the team to pass on their expertise gained on in-service courses to the whole staff.
Recommendation 7 That schools evaluate the operation of their health education policy regularly as part of a rolling programme of curriculum review.

Box 14 Recommendations for the preferred model of the science department's contribution to health education

Supporting the school's health education policy in the science department

When the science department has taken part in the overall policy decisions about coordinated health education in school, and helped to produce an analysis of what is happening throughout the school, then the department as a whole needs to examine its own syllabus in the context of the health education policy.

Recommendation 8 That science departments conduct their own survey of health education teaching in the department.

Box 14 (contd)

The following aspects are relevant:

- resources available;
- scientific concepts being taught;
- skills being taught;
- teaching methods being used;
- year to whom concept is taught;
- level at which concept is taught;
- prior knowledge youngsters are expected to have (for example from last year of the primary school).

This information might be collected by compiling a grid. This may help in gaining a comprehensive picture of the department's practices, and one that is much more detailed than the whole-school survey could provide.

Recommendation 9 That science departments compare their contributions to health education with those of the rest of the school.

Box 14 (contd)

This means comparing your grid with the information on the whole-school grid to see who teaches what, when and how. It will also enable you to identify the resources and expertise available in other departments.

Recommendation 10 That science departments re-examine their curriculum including teaching and learning approaches to see if it matches the school's health education policy and ensure that their own aims contain a reference to health education.

Box 14 (contd)

This may mean asking whether your teaching methods, for instance, encourage decision making, or whether there are parts of the curriculum that might make better sense for youngsters if taught as part of a cross-curricular course. The answers to these questions may imply some changes in the department's practices. It may be, for instance, that the analysis shows that all the moral and ethical issues connected with science are being taught outside the department, and that science teachers are simply cast in the role of teaching 'the facts'. That may mean that the image of science that youngsters are getting is one of a set of 'right answers'. That may not be an image with which the department is entirely content.

REFLECTIONS

What are the images of science which your department portrays?

Do they, for instance, include examples of science that is male dominated and deals almost exclusively with western science or are the images ones of an experimental quest which occurs across many cultural boundaries?

What images of health education do your text books present to youngsters?

Case Study 4
The role of the health education coordinator

by David Moffitt, Killyleagh High School, Killyleagh, Co. Down

This school, Killyleagh High, was one of the original members of the SCHEP pilot scheme (see 1.1). At that time the coordinator took on the responsibility for health education in the school. The coordinator looked at the health education topics being taught in each department, and the depth, emphasis and methods of teaching used. At the end of this investigation a complete picture of the school's health education efforts could be seen.

The picture that emerged was, no doubt, similar to that in many other schools. Although many health education topics were being covered, there were differences between the knowledge received by boys and that received by girls. The subjects chosen in the upper school also affected the amount of knowledge of health topics received by a pupil. For example, biology, physical education and home economics were subjects which provided much of the health education information, as one might expect. Those who did not choose these subjects would not receive the same level of health education as those who did.

Since, in the early days, there was not an allocated slot in the timetable for health education, the coordinator, having identified those who had some health education in their courses (just about every teacher) simply became a provider of up-to-date material, audio/visual aids, etc. About this time active tutorial techniques were introduced into Northern Ireland. Health education coordinators attended courses on these techniques and then returned to school to pass on this information to their colleagues. Active tutorial techniques are ideal for health education; they add a new dimension to the topic and encourage pupils to make positive decisions for themselves.

The coordinator also tries to encourage teachers to increase the amount of health education in their syllabuses. This is perhaps a more difficult task further up the school where examination pressures leave little room for manoeuvre.

In the last three years health education has become an established part of the timetable for forms 1 to 3. Each year receives a 35-minute lesson each week. This means that it is now possible to set down a syllabus for these classes which contains all the important topics, some of which teachers previously did not have time to develop in their normal subject classes. The coordinator plays a major role in the development of the syllabus. The syllabus will, of course, be a moulding together of ideas from colleagues throughout the school (especially those who have experience of teaching areas of this subject). It may also be possible to look at ideas from other schools, government health education personnel or any other useful sources.

Once the syllabus is complete the next task is to develop with the health education team the teaching strategies which should be used to get the best from each topic. It is very easy to fall into a system of giving pupils a list of dos and don'ts, which will probably lead to a 'switching-off' by pupils. The strategies that this school's health education team adopted were basically those from

active tutorial i.e. group work, role play, games and surveys. This should allow pupils to come to the correct decisions themselves.

The coordinator, now having a clear idea of the direction of the course, can go about the task of procuring material for use in these classes. A library of health education materials i.e. worksheets, posters, film strips and text books has been set up in a central location so that teachers can withdraw material when required. Teachers are encouraged to add to and improve existing material, the idea being that pooling resources means that the workload is reduced for those teaching this topic. The coordinator should be looking for any relevant film material which can then be ordered and checked for suitability.

As yet a permanent team of health education teachers has not been set up and so each year one or two teachers new to health education join the team whilst others are taken out. This is purely a timetabling decision in that other subjects are obviously allocated their teaching staff first and those teachers with spare teaching time are then used to fill the health education needs. The coordinator, being the only full-time member of the department, must inform the newcomers of the aims and objectives of the course as well as the content. It may also be necessary to explain the active tutorial methods that they will have to adopt for these lessons. Life, will, of course, have been made easier for them due to the existence of the library of resources.

By the end of the first three years the pupils will have a good grounding in most topics of health education. When pupils make their choices for forms 4 and 5 they will find that many of the topics they have learnt in forms 1 to 3 will be re-emphasised in their chosen subjects. However, to reinforce this, modules have been designed which all pupils take. These modules are non-examinable at the end of form 5 but it is hoped that they will enhance the work done by pupils in other subjects. These modules include health education, traffic education, gardening, cookery for boys and craft–design–technology for girls. Pupils spend three 35-minute periods in these groups per week. Each module lasts for a set number of weeks and then the pupils change round. During these sessions a more detailed investigation of health topics can be undertaken. Topics more suited to the 15- to 16-year-old age group can be tackled.

A major problem is, inevitably, finance. Under the present conditions of financial restraint it can be difficult to obtain a reasonable allowance for this subject. Health education usually ends up at the bottom of the list financially, understandably so, since examination subjects are given priority. This problem can be alleviated by ordering free films, collecting literature from health centres and possibly borrowing equipment from other departments.

In summary, then, a coordinator should be a keeper, procurer and organiser of resources. He/she must also be willing to encourage others in the adoption of new classroom techniques. Finally he/she must endeavour to keep up with the ever-increasing amount of information available for this topic.

Case Study 5
'Something useful' – cross-curricular smoking project
by Mick Nott, North West Regional Project Officer, SSCR

'My sister in the first year brought the leaflet home and gave it to me to read. I knew she'd do it and I cracked up. My mum said, "It's about time that school did something useful."' — comment made by fifth-year girl to the author.

This case study is a preliminary report of a health education project run at Orton Longueville school for one week during March. It describes how the project was initiated, developed and implemented.

Initiation

In December 1985, the school received details of the Health Education Council's *Family Smoking Project* (**4.2**). The school already includes some work on smoking in the third-year biology course and fourth-year social education course, but there is little in lower classes. I knew from my reading that smoking education was most effective with the 8–13 age range. The details from the HEC clearly indicated that the work could be used with first-year pupils.

I showed the work to a member of the science department who was interested in health education and he suggested that it was so important we should devote the first-year science lessons in the week of National No-Smoking Day to the project. He ordered the materials and I agreed to approach other departments to see if they would consider taking part. Initial tentative approaches indicated sufficient interest for plans to be drawn up. The initial plans consisted of an outline sketch of how departments might contribute to the project. These included suggestions such as:

Science and PE
work on breathing rate and pulse rate before and after exercise;
measuring vital capacity and lung pressure;
ethics of smoking research;
lung dissection;
smoking machine — comparing tar from different brands.

Mathematics
cost of smoking;
smoking survey of first years;
probability and risk using smoking figures.

Integrated Studies
tobacco — where it is grown;
how cigarettes are made and transported;
dependence of the developing world on the developed world;
history of smoking.

Art
projected images of smokers and cigarettes;
making alternative no-smoking advertisements.

Tutorial time
case studies of why teachers do/did/do not smoke;
pupils' attitudes to adults at school who smoke;
what would pupils' school policy on smoking include/exclude?

The outline plan also included references to the pupils' material from the project, copies of which were given to each participating department.

The outline suggestions were submitted to the Headteacher who gave his approval and support. The plan was then circulated to teachers whom I thought might be interested in giving their support. In some cases this was the head of department, who went on and generated enthusiasm within the department. Approaches from within the department are 'warmer' and more likely to succeed, as in this case. The relationships within a department are of crucial importance when introducing cross-curricular work. They can be the rock upon which a plan founders. After agreement from various departments, and a clear indication that the project was being pursued on the premise of 'How can smoking education help us to teach our subject?' rather than 'How can our subject contribute to smoking education?' the outline plan was put into action.

Figure 2 gives a brief summary of the steps in the process leading up to the week's work.

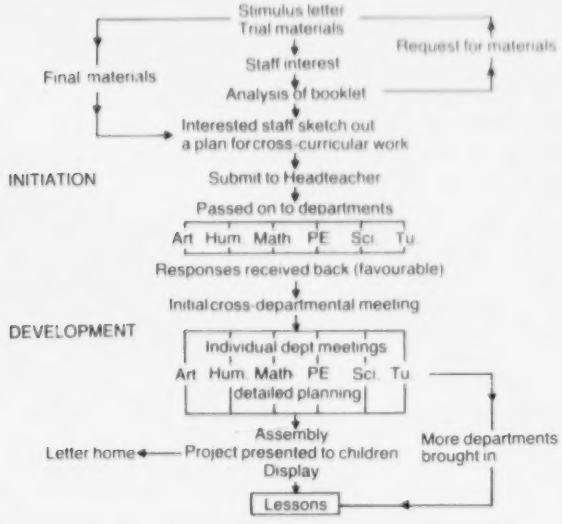


Fig. 2 Steps towards the week's work

Development

The Headteacher gave permission for tutorial time to be used for members of departments to meet and plan, although this caused some problems as teacher action was still in progress. Lesson plans were sketched out, with most departments giving from one to three lessons to the project. Science developed two lessons, as outlined briefly below. The departmental meeting was used in demonstrating the use of the apparatus detailed in the lesson plans.

Science: lesson 1

The purpose of the lesson is to investigate the substances that are given out by cigarettes.

- begin with discussion in small groups based on the pupils' manuals;
- continue with a demonstration of a smoking machine;
- get pupils to compile results of differences in weight and colour change of cotton wool, using different brands of cigarettes;
- investigate the acidity of cigarette smoke by demonstrating its action on universal indicator;
- condense the smoke in packed ice to smell the product.

Science: lesson 2

The purpose of this lesson is to help pupils learn about the lungs and how they work. Aspects to be investigated might include:

- lung dissection;
- lung structure and function;
- ethics of using animal organs for demonstration of scientific principles;
- discussion in small groups of their attitudes to smoking after the series of lessons.

The rest of the development consisted of organising folders of work containing the pupil's booklet and paper to work on so that the whole project could be retained by each pupil as a complete entity.

Preparation

The Friday before the work began on Monday saw the first-year assembly devoted to the issue of smoking. The assembly consisted of asking the pupils to guess the subject of a song and holding a discussion on smoking. The song 'Virginia Weed' (Mickey Jupp from the album *Can't Dance*, A. and M. Records) was played as youngsters filed out of assembly and collected a letter and leaflet for their parents. The letter informed the parents of the project and its purpose and encouraged them to read the accompanying leaflet and discuss the

experiences the pupils would be having during the next week, when they came home from school.

Implementation

The project continued for a week. During that time, much of the work detailed in the outline plan was carried out. In the integrated studies work, for example, the youngsters were engaged in the following lessons.

Lesson 1
The farming game, looking at tobacco as a cash crop.

Lesson 2
Passing Clouds video (first half) ('Horizon' television programme, BBC) followed by historical case studies and role play based upon portrayal of tobacco at various stages in history.

Lesson 3
Completion of *Passing Clouds* video and completion of role plays.

The study was evaluated with questionnaires, details of which are in Case Study 9 (Section 9).

Case Study 6
A team approach to health education coordination in a large comprehensive school

By Philip Munson, Science Adviser, Kent Education Authority

Introduction

This case study describes the attempt to introduce a coordinated health education programme into a large secondary school using a team approach. This initiative is not yet fully implemented for a variety of reasons, the most significant of which has been the lack of time in relation to the magnitude of the task and the current teacher action. A team approach without meetings is inevitably a non-starter!

However, the teachers involved recognise the need for a coordinated approach to a health education programme to replace the rather ad-hoc arrangements that exist at present and are committed to the success of this venture.

The school

The structure of the Geoffrey Chaucer School, Canterbury, is probably unique. It is located in an area of Kent where selection at 11+ still exists. It is a seven-form entry school of about 1200 pupils, with a sixth form of nearly 200 students. The first-year intake comprises three classes of selected boys and four mixed classes of unselected pupils. As can be imagined, this distorted intake creates problems beyond those normally encountered by any curriculum development initiative.

Nevertheless, the Geoffrey Chaucer School still experiences many of the trials and tribulations associated with any attempt to introduce a coordinated health education programme into a large all-ability secondary school.

Why a team approach?

The Schools Council/Health Education Council Project (**1.1**) favours having an individual acting as coordinator, and has produced a comprehensive coordinator's guide. Such coordinators are faced with a very difficult task, especially in large schools, because they find it difficult to promote change across the boundaries of the power bases of the traditional subject divisions. Their problem is usually exacerbated by the fact that such a post also has relatively low status in the school's hierarchical management structure.

To attempt to overcome these problems the Geoffrey Chaucer School decided to promote health education across the curriculum using a team approach to coordination. The team needed to establish its credibility within the school, especially with the senior management team and the faculty Heads, among whom were some who considered themselves 'experts' on health education in its traditional forms. Establishing this credibility could only be done by the professionalism of the team members in their approach to curriculum development and by the quality of their product. Team members who were respected in their own faculties would be expected to implement the relevant parts of the programme. Within their own faculties they could provide the necessary support to other colleagues who were less familiar with the intended content and required teaching styles.

A good health education programme needs to be able to respond, fairly rapidly, to issues of the day which might be significant. This is certainly one of the strengths of the team approach because it sees the curriculum as dynamic and responsive. It is thus able to overcome the traditional inertia which exists in schools when it comes to curriculum development, and institute appropriate changes when required.

Once the course was established the team would continue to service and promote the course and retain accountability for the school's health education programme to the Deputy Head (Pastoral).

Team selection

Criteria for team membership

The senior management team (represented by the Pastoral Deputy Head) was convinced of the need for a coordinated approach to a health education

programme and agreed, in conjunction with the County SSCR Coordinator, to pilot a team approach.

Staff known to be committed to health education and willing to introduce new teaching methodologies were identified and invited to join the team.

Building the team

At first it was felt that all six faculties should be represented on the team but this made it rather unwieldy. Eventually the team was made up of six members, chaired initially by the County SSCR Coordinator, as follows:

Humanities faculty (1);
Physical education faculty (1);
Design faculty (1);
Science faculty (2);
Pastoral section Heads (1).

(One member from both the arts faculty and the maths faculty was nominated as a consultant, to be called upon if it was felt that their facilities could contribute to the programme.)

Once established the group would be chaired on a rotational basis and any member of the group leaving the school would be replaced by a member of the same faculty.

The commitment of the team is at an almost emotional level but this is constrained by the professionalism that they realise is required to provide a realistic and sustainable programme. The strength of their commitment, however, enables them to operate beyond the vested interests at faculty/department level which often surface in such cross-curricular initiatives.

It was agreed that the team should also include a parent, the school nurse and a local general practitioner. The timing of their introduction gave rise to some debate but it was eventually agreed that they would be invited to join the team at the beginning of the curriculum development phase. This was because the team felt that their time as professionals outside the teaching force was valuable and it would not be altogether productive to involve them in the review stage. Their contributions at development and implementation phases were expected to be essential.

The development strategy

Finding out the existing programme

In the first instance the team was to find a systematic procedure for determining the existing piecemeal contributions to health education offered throughout the school.

Developing a new programme

An appropriate and relevant course was then to be constructed and designed to be promoted through a variety of outlets such as assemblies, tutor periods and special sessions with year groups, as well as in the more traditional classroom activities.

Implementing the new programme

The course was to be implemented in phases, starting with the first two years. It was considered important not to fall into the trap of trying to be over-ambitious about what could be achieved in the time available. The golden curriculum development rule for in-school initiatives, to apply at all times, is 'discrete, manageable tasks'.

Progress made

1 The group initiated a survey of the current health education provision in the school using the grids available in *Developing Health Education* (**1.1**), since it needed a clear picture of what was being done and by whom. The group agreed that any existing good practice should be retained within the revised programme.
2 A 'brainstorming' session was then held with the help of the SSCR's Health Education Research and Development Officer, using the content area identified in *Developing Health Education* (**1.1**) as a starting point. This was a first step in identifying broad content areas for the course.
3 These ideas were then categorised and distributed in draft form to appropriate members of the group. They were asked to try to identify any omissions and then to outline a possible order of presentation.
4 At subsequent meetings these outlines were considered, areas of overlap identified and finally a definitive 'content map' produced. This 'content map' is based on the areas identified in point 2 above, and is being used to develop the programme for each year right through to the sixth form.

This is the position of the group at the time of writing (January 1986).

What next?

The following actions are planned:

1 Expand the group by inviting the non-teaching members to join.
2 Decide on the target audience for its content areas.
3 Establish modes of presentation.
4 Prepare materials for presentation where appropriate, which includes identifying any relevant resource material available.
5 Have in mind throughout all the development phases that the material must provide the opportunity for all pupils in all traditional

subject areas to improve their self-awareness and develop their decision-making skills.

6 Have in mind that the course for the first two years must be available for presentation in September 1986.

Case Study 7
Setting up a health education planning team

by Di Bentley

One school in our experience successfully operated the following structure. We draw it out in some detail here, so that the implications of its operation become clear. The team was composed of the following people:

1 two senior pupils — one male, one female;
2 one member of each of the following departments — science, home economics, physical education, religious education;
3 two senior representatives of pastoral care and the tutorial system;
4 two parents — one male, one female, one of whom is a parent governor;
5 district health education officer;
6 school nurse;
7 the curriculum deputy;
8 a teacher with responsibility for multicultural education in the school;
9 a primary school liaison person.

In all the team was composed of 14 full-time members. Occasionally, the team invited peripatetic members as well. Each member had specific responsibilities for reporting back to the constituencies which they represented. At first sight, 14 looks like an unwieldy number, especially in terms of getting discussions started and setting meeting dates. It is obvious that small subcommittees will be most efficient in carrying out some tasks, but the full group is also useful on some occasions, as the descriptions below will make clear. We describe six tasks; each description is followed by our comments.

Tasks of the team

1. The first task is to draw up an overall policy for health education in the school.

Comments

It is likely that your own LEA may already have a policy. Many schools make their initial discussions easier by using the LEA policy as a starting point and modifying it for their own purposes. Such policies usually have recommendations about topics to be taught, teaching methods, and the interfacing with the 'hidden curriculum' of the school. In terms of what should be taught, the views of the pupil and parent representatives can make a very valuable contribution to this debate, since they present different perspectives of what is being taught at present, and how it meets, or falls short of, their needs. Some schools when deciding their policy have contacted a wider audience of parents and youngsters. Many have made use of the *Just a Tick* questionnaire from Exeter University (**3.4**). This exists in versions for teachers, pupils and parents, asking each what they think should be included in the health education curriculum.

2. The second task is to explore present practice.

Comments

Having decided what is to be taught, how, when, and to whom, the next task is to discover how much is already done in the school and, much more importantly, how it is taught. Case Study 6 from Geoffrey Chaucer School provides good suggestions for this. Other suggestions include asking some team members to keep diaries of the health aspects of the lessons they experience either as teachers or pupils and asking parents and the school nurse to prepare a case study of the aspects of the 'hidden curriculum' which they experience in their work around the school. In the experience of our working groups, details of the data collection, such as analysing grids, reading schemes of work, writing diaries or case studies, must be fully explained to the whole staff before the exercise is begun, so as to achieve more than just their full cooperation, but to arouse their interest as well.

3. The third task is to match policy and present practice.

Comments

Once the data have been collected, many schools display the results for the whole staff to read, and a few, for the pupils as well. The next task for the team is to match what is taught against what you would want to be taught and then to begin to fill in the gaps and/or persuade subject teachers to match their topic teaching with your policy.

(It was at this point that the team of 14 proved to be a very useful size. Whilst discussions with 14 people can be difficult to organise, work which involves finding resources, planning their use, writing materials, drawing and preparing work, inviting outside speakers and organising any 'health initiatives' on a whole-school basis, is made considerably easier by having this number of people involved.)

4. The fourth task is to evaluate the policy.

Comments

The team also needs to be involved in instituting a

rolling programme of reviewing the policy. This means discussing, carefully introducing to staff, organising and operating an effective evaluation of the changes which the policy brings about (see Section 9).

5. The fifth task is interfacing with planning in the remainder of the curriculum.

Comments

One essential job to be done throughout the whole of this process is to keep others, such as the other staff, parents, the Head, the local authority Advisers and the board of governors, regularly informed. Such changes as may come about may mean discussion of financial distribution in the school, or time redistribution. It is essential that the team nominates, as the reporting procedures show, one person to report back to the overall curriculum policy team. In this way, the health education policy remains as a part of the mainstream of the curriculum planning in the school.

6. The sixth task is to maintain the team's professional development.

Comments

It is important to keep the professional development of the team members up to date. In-service training in aspects of health education and group dynamics is essential if you are to work effectively as a team, especially in a team where pupils are now peers. The local Adviser can be useful in helping you to identify the needs you have in this area and, in conjunction with the district health education officer, in helping you to meet them. You need to make sure that each member of the team passes on expertise gained in such courses to the group they are representing in school wherever possible. One school did this by organising a whole-school-based in-service training day. The team members acted as group leaders, planning their own input and helping other teachers, senior pupils, parents and governors to gain some insights into new teaching methods and experiences of health in the local area. This meant that senior pupils were leading groups containing teachers and governors. It proved an interesting and thought-provoking experience for them all!

SECTION FIVE

Who teaches health education?

The question of who should play the role of health educator in the lives of youngsters is a complex one. Health education is one of the few areas of the curriculum in which parents must be consulted and informed about the substance of some lessons. Besides parents, who plainly have a right to opt for conducting their offspring's health education themselves, there are other members of the community who also see themselves as having a part to play in health education outside the immediate school environment, such as health visitors, school nurses, doctors, dentists and district health education officers.

This section examines some of the ways in which teachers, parents and other professionals might cooperate in the health education of young people. It goes on to make some recommendations for cooperative ventures between all the individuals involved in the health education of youngsters.

The role of youngsters in their own health decisions

Peer-group tutoring and nutrition education

Case Study 8 at the end of this section raises some important questions about who youngsters see health educators to be. The young people interviewed did not place teachers high on their list of health educators. It is inevitable that with the high status the medical profession holds in society, young people will regard the members of it as an obvious and expert source of health information and education. The case study suggests two ways in which teachers can take advantage of this:

1 share their health education role overtly with medical people by inviting them in to lessons;

2 teach young people how to obtain information from doctors and nurses.

Case Study 8 mentions that two other important sources of information, especially as children become adolescents, are the mass media (magazines and television) and peers. Peers exercise a powerful influence at this age and perhaps teachers can harness it to help young people learn positively from each other.

Case Study 3 (Section 3) gave an example of a cross-curricular approach to nutrition education in one school. One of the features of that piece of research was the involvement of older pupils in teaching the first- and second-years. Interviews conducted with the fourth-year girls who did the actual teaching raised the following points:

1 Youngsters who peer-teach are well aware of the need to tailor their teaching to the audience.

We simplified the words because we felt they wouldn't understand some of the longer, more complicated ones. — Helen.

We felt it would confuse them if we put in ideas they hadn't come across before. — Megan.

They also organised their presentation to ensure variety and maintain interest.

We had an experiment in the presentation . . . it was useful because it helped them to be more interested. They wanted to know what happened at the end. Some of them were very surprised. It helped them to understand better as well, seeing it like that. — Alison.

2 Youngsters' personal understandings of concepts can benefit a great deal in the preparation of work which has to be explained to their peers.

. . . it made us aware of what other people [the first years] know and think. It was useful . . . Having to sort it all out made me know and understand it better — Alison.

Some of the questions [which the first years asked] . . . we weren't sure of the answers . . . But because you have to answer, you do. It helps you to sort it out in your own mind because it makes you make a reply — Nichola.

3 Youngsters re-examine their own health attitudes and behaviour as a result of having to teach others about issues.

It [teaching others] has made us more aware of the effects of good nutrition. Just sort of having to explain it makes you kind of realise it more. — Helen.

DB: *Has it changed* your *eating habits?*

Yes, I think so. I mean, I think about it now when I go to the shops . . . now I know what it's doing to me and I'm aware I think about it before I make the choice. —Helen.

4 Peer-teaching has a positive effect upon the self-esteem of the youngsters themselves.

In home economics when someone asks a question about nutrition, the teacher asks us the answer. She tells others to ask us as well. It's sort of like making you into an expert. — Nichola.

DB: *Do you enjoy being a mini-expert?*

Nichola: *Yes!*

The youngsters who received the peer-teaching were also interviewed. For them it was enjoyable being taught by their peers and they would welcome it as a change more frequently.

Yes [I enjoyed them teaching us] . . . You're used to teachers but children . . . well . . . somehow it's better. I mean like with teachers somehow you just switch off, but with children teaching you it's more interesting. — Diana.

It wasn't as boring because they were more round your age group and you could understand them better. — David.

It's better, because they take things the same as you. Teachers do it a different way ...Also it's easier to ask questions when it's pupils than when it's teachers. — Anthony.

From this example, there seem to be several major advantages to peer-teaching from the viewpoints of youngsters. As far as the youngsters who *do* the teaching are concerned, there are three advantages. First, teaching others helps them to explicate and clarify their own knowledge. Secondly, it helps them to become competent users of that knowledge. In the words of the King of Siam, 'They are sure of what they absolutely know'. Thirdly, their self-esteem receives a positive boost from such experiences. The receivers of the teaching find question-asking less inhibiting, and have an awareness that the peer-teachers have shown a care and sensitivity for where the learners begin. In Anthony's words, 'They take things the same as you. Teachers do it a different way'. It may be that peer-teaching offers one way of starting where youngsters are.

This first example was chosen to provide some insight into youngsters' views of peer-tutoring. Our second example is designed to show how teachers might organise such events in science classrooms. It is drawn from a peer-tutoring project from the Health Education Council, *Smoking and Me* (**5.1**). The project materials provide background information on the topic of smoking at a level which youngsters can understand, help teachers to select group leaders from the children they are teaching and advise them on their roles. We include below the advice given in the teachers' guide for the selection of peer-group leaders. The important points to notice are the time required for preparation of the leaders for their role, the advice to youngsters

about selecting leaders and early preparation for such problems as absence in the class.

Choosing group leaders

You will recognise the children who are leaders among their peers in your classroom, but it is important that your ideas are not imposed on the children. Clearly your class should have been together long enough for the children to get to know each other, though *you will organise the procedure for choosing the leaders*. It is important to note that the group leader is *not* a substitute for you, the teacher.

The most appropriate way of choosing leaders is simply by asking each child in the class who he or she thinks would make a good group leader. Children may be quite used to choosing leaders in this way, especially for team games, or for presenting some group findings to the rest of the class. The nature of the group leader role in *Smoking and Me*, however, is rather different, and for this reason you need to prepare your class and, more specifically, the group leaders thoroughly before the lesson programme is due to begin. You will need plenty of time not only for discussing with the leaders their general responsibilities, but also for explaining the particular activities of each lesson.

1 *Explain* to your class that you are going to have a series of lessons about smoking and that most of the work is going to be done in small groups.
2 *Discuss* what it means to work in a group, in terms of *cooperation*, *listening* to what others have to say and *respecting* opinions different from your own, for example. Stress the necessity of bearing these points in mind when deciding whom to work with in groups.
3 *Explain* that a leader for each group will be required. Not only will the leader be responsible for organising the activities to be done in each group, but he or she will also have to present some of the work of the group to the rest of the class. Everyone should, therefore, think very carefully about whom to choose as a group leader.
4 Get your class to divide themselves into numbered groups of six or seven.
5 Give each child a piece of paper on which to write their group number and the names of two members of the group whom they think would make good group leaders. You should then collect the papers and, with the help of a child from each group, tally them according to frequency of nomination. The children most frequently nominated are then invited to act as leaders for their group.
6 You should keep a record of the composition of each of the groups with a note of the name of the child who was runner-up in the choice for group leader in case the chosen leader is absent at any time.

***Box 15** Guidelines for organising selection of leaders*

Just as instructions to the teacher are necessary, so are those for peer-group leaders. The project is careful to tailor these to the reading level of the youngsters concerned, and to direct their attention to the processes and group dynamics with which they will be operating.

Your teacher will have talked to you about the important part that you are going to play during these lessons, and before each lesson will give you a plan to follow; here are a few reminders that will help you in your work with your group.

1 *Follow instructions carefully*. If there is anything you do not understand — ask the teacher.
2 *Always be prepared*. Read over your notes very carefully before each lesson and have all that you need ready so that you know exactly what you are doing.
3 *Explain things carefully to your group*. Make sure everybody knows what has to be done.
4 *Make sure that everyone in the group takes part*. Encourage the quieter members to give their ideas and make sure it isn't always the same people who answer.
5 *Write down all the important things said in your group*. You will then be able to tell these to the rest of the class.
6 *Be yourself*. Your friends chose you because they felt *you* would make a good leader, so WORK HARD AND SMILE!

IF THERE IS ANYTHING YOU DO NOT UNDERSTAND — ASK YOUR TEACHER

***Box 16** Notes for group leaders*

Each lesson also contains detailed notes for teacher and group leader. The lessons themselves involve the youngsters in quite complex teaching strategies such as small-group discussions, report presentations via collages and role play. The advice is very practical and continually refers the peer-group leaders back to the teacher, thereby directing attention towards the role of teachers as organisers, planners and facilitators. The programme itself is organised around five lessons. We present part of lesson 2 for readers to see the kind of activities the group leaders are asked to deal with.

The purpose of the lesson is the estimation of the number of smokers. We suggest the following procedure:

1 Remind class of groupings.
2 Write on the board the average percentage estimate of the number of smokers in the same year made by the children, and the percentage of smokers of comparable age obtained from the survey. (It is most likely that the class will overestimate the number of smokers. In fact, smokers are *not* a majority of the population.)

***Box 17** Lesson 2: How to say 'No' — notes for teachers*

1 Say to your group, 'In the last lesson we guessed the number of smokers in our year. Our guess was that on average ... per cent smoke. We don't know the exact numbers of smokers in our year, but we do have the results from a large survey done in another part of the country and that survey showed that only 11 per cent of 12-year-olds smoke. Was your guess correct?' If not, can you think why? Get your group to give reasons for this. 'It may be that fewer smoke than we think and that *not* smoking is the normal behaviour.'

2 (a) Ask your group, 'Have any of you been offered a cigarette?, Where were you at the time? What did you do?' (If they accepted a cigarette ask for suggestions on how they might have refused one.) Write down on a large sheet of paper the different places where they were offered a cigarette.
(b) Then ask, 'Can you think of any other places where you might be offered a cigarette?' Add these suggestions to those already on the list. Discuss further with the group how they might refuse the offer of a cigarette on such occasions.

3 (a) Get each member of your group to choose a partner.
(b) From the list you have made give each pair a situation where they might be persuaded to smoke. One of the pair should take the part of a smoker offering a cigarette to the other, a non-smoker, who has to find ways of refusing it. Allow them time to practise this.
(c) Ask each pair in turn to perform their sketch for other members of the group. (They should give an introduction to it first.)
(d) Ask for comments on each sketch:
- What was good about it?
- Could you hear all that was said?
- Were you given enough background information?
- Discuss different ways of refusing a cigarette.

(e) Ask each pair to repeat the sketch, changing parts (smoker takes part of non-smoker and vice versa).

4 At the end of the lesson say to your group, 'Before next lesson, think about the rights that non-smokers have'.

***Box 18** Lesson 2: How to say 'No' — notes for group leaders*

This example gives some idea of the level of detail and preparation which is required if peer-group tutoring is to be successful.

There are other issues which need to be taken into account as well. These are mainly concerned with allocating time to talk to peer-group leaders and ensuring that they understand their tasks for each lesson and feel competent to deal with them. This may require a considerable amount of restructuring of the lessons prior to the programme of peer-tutoring to get the group leaders together to discuss any potential problems or requirements. In the last analysis, only the teacher can make the decision as to whether the amount of prior presentation required is time usefully spent in terms of the advantages as the youngsters in the first example saw them. We certainly see peer-group tutoring as being a technique which provides many avenues towards the goal of enabling youngsters to become actively involved in their own education. More than that, it helps them to become competent in using the knowledge they have acquired.

The role of other health professionals

The HMI document, *Health education 5-16* (**3.1**, p.25) states that:

> *. . . so that health education...can make a contribution to the preparation of pupils for a healthy adult life... the following arrangements are necessary in schools: the establishment of effective links with external agencies — the LEA advisory service and health education officers, in particular, and the school meals service — in order to be well informed and to make full use of all available resources for learning.*

Other agencies suggested as useful links are the Royal Society for Prevention of Accidents (ROSPA), health visitors, school nurses and youth workers.

In the Review we agree that the involvement of such expertise is essential. However, it is not something to be entered into without planning.

1 What do I expect of the visitor?
2 What is the visitor like in front of a class?
3 Has someone else in school invited the visitor previously?
4 Can I get to know something about their style of operation in advance?
5 Will their style suit my class?
6 What are the visitor's expectations of the experience?
7 Does the visitor have a realistic idea of the level of understanding of the young people?
8 How can I help the visitor to understand what to expect?
9 How can I make it a pleasant experience for the youngsters and the visitors?
10 When do I need to involve the visitor — at the planning stage for the year, or for the unit, or for that piece of work?
11 How can I ascertain their needs?
12 What will they feel like on entering the school — is it a daunting experience for strangers?
13 Do I need to arrange an introductory visit?
14 How can I best prepare the class?
15 How structured does the lesson need to be to ensure that the class asks some questions — preferably the right ones?

***Box 19** A checklist of questions on planning for visitors to the classroom*

These may be some of the questions that run through the minds of teachers before a visit to their classrooms by outsiders. Several projects, such as *Active Tutorial Work* (**5.2**) and *SCHEP 13–18* (**1.1**) have developed what they call 'the visitor technique'. This is a means of enabling young people to involve themselves with visitors in a worthwhile way, fulfilling both the functions of practising social skills and discovering information. We make some suggestions for a 'Visitors to science lessons' technique:

1 It is helpful if the visitors are involved in the planning of the visit as early as possible. Some health professionals, such as the school nurse and the health education officer, may be part of the health education planning team mentioned in Section 4. They will be familiar with health education work and will have the most up-to-date information that could be used in the classroom. Others may need to be involved as the unit is first planned so that they can proffer advice on the shape of ideas and possible outcomes. This planning may take place long before the actual visit.

2 Discovering the prior expectations of all involved can save time and frustration. What do the young people expect of the visitor? What does she expect from the class? Will she be daunted by questions? How does she want the room arranged? The answers to these questions can often make a considerable difference to the ease with which a visitor handles a situation. Some of the Review's working groups send out information about the school, the course and the young people to the visitor beforehand. They often involve the young people in this, asking them to write a short description of themselves telling the visitor what they want them to know in advance. They also get the visitor to reciprocate for the class, so that the youngsters know what to expect.

3 Preparing the young people and the visitor carefully can pay dividends in spontaneity later. The visitor can be invited into a practical lesson before the visit. This is especially useful if it is work taking place immediately prior to the visit, or is the study which sparked off the request for a particular visitor. It also gives the visitor an opportunity to meet the class more informally, and wander around getting to know individuals at a time when the visitor is not 'on show'. The class also need some prior preparation, so that they know who is going to welcome the visitor, introduce her, thank her, help out with supplying people's names, etc. Areas of information that need to be covered should be discussed in advance, so that the youngsters have a clear idea beforehand of what questions they might ask.

4 Treating the visitor as someone special can help to establish their relationship with the class. This means ensuring that someone meets the visitor in the entrance hall, escorts them to the lesson, perhaps pointing out some wall displays on the way, introduces them to the class and escorts them away at the end. Asking the youngsters to arrange the room informally, perhaps, and to introduce themselves before the talk begins can also take some of the pressure off the visitor. Recording the visit photographically — formally or informally — during the session is useful. If such photographs are later displayed, this can help to establish the idea that the science classroom is a welcoming place, and help to encourage parents to take part too.

Parents as partners

The HMI document *Health education 5-16* (**3.1**) stresses the importance of involving parents in a cooperative exercise with the school,

> *so that between them they can provide a sound basis for children to make informed choices and take increasing responsibility for their health.*

It points out that section 8(5) of the Education Act (1980) requires that schools inform parents of the manner and context in which education about sexual matters is to be given in schools. However, whilst the discussion document urges schools to discuss the issues of provision for education in sexual matters as sensitively and openly as possible with parents, and to take their views into account whenever possible, it points out that such curriculum issues are as much a part of the schools' provision as any other area and that

> *there is no statutory provision for the withdrawal of pupils.*

For some schools where young people come from a wide variety of religious and cultural backgrounds, the problems of involving parents in some aspects of their health education programmes are immense. We have few suggestions to make for science teachers faced with these particularly sensitive issues, except to say that open communication with several sets of people and extreme sensitivity are the keynotes for action.

- Board of governors
- LEA Advisers
- Headteacher
- Parents
- Other staff
- Pupils

Box 20 *The groups of people to whom teachers need to communicate the aims of health education.*

How can parents be involved in the classroom? Many have occupations which would make them suitable for inclusion in the list of classroom visitors. Others have expertise outside their jobs which can be of great value to schools. Some schools have built up registers of expertise among their parents. Many parents can be involved in less formal ways, for example by helping with extra-curricular school activities.

Case Study 8

Youngsters' views of health and some implications

by David Wallwork, Deputy Headteacher, Alwyn Community School, Ramsey, Cambridge

The views expressed here are a summary of thoughts, ideas and opinions collected during interviews with secondary school pupils and with a sample of their parents, teachers and doctors. More than 200 pupils were involved in the research, which was carried out in the autumn term of 1985.

Young persons' views of health would seem for the most part to be limited to that bit of it which has immediate relevance to them. Most of them define health in terms of fitness and absence of disease or infirmity.

The quotations below came from two 13-year-old youngsters, a girl and a boy, who were asked what 'being healthy' is.

> *Being healthy is not being ill, being active, and having a good appetite; getting fresh air, seeing your friends, having nice food, drinking lots of milk.* — Nicola, aged 13.

> *Being healthy is being fit and all your main organs are working properly. It's when you feel good and you are able to do sports. It's the opposite from ill and unfit. You are healthy when you don't run out of energy quickly. Also, you wouldn't have aches and pain, etc. When you're healthy you don't get constipated.* (Boy aged 13).

They usually consider themselves and their friends to be healthy and show little concern for any long-term view.

Young children are very dependent on adults for their health education. They are bombarded by messages, some conflicting, which are designed to shape their health-related behaviour. The pre-teenage youngster relies on adults, usually parents, to sort the messages and to differentiate right from wrong, good from bad and accurate for inaccurate. This implies a good deal of trust and children appear to take for granted that they have been given correct information because 'parents care'. This trust may be extended to other adults, but discussions with 11-year-old children suggest that this only exceptionally includes teachers.

As young children develop into adolescents, their views of health and of the information that they receive would seem to change. They begin to define health in a much wider sense and begin to include mental and emotional states. One 14-year-old girl wrote her thoughts about health as follows:

> *Healthy is: having all your organs in good working order; not being disabled; being able to eat and drink properly; not being mentally ill; being able to see and hear; being able to blow your nose; being able to get fresh air; being able to read and write; being able to mix with other people; not being too fat; being able to mix with pets; having a good sex life; not living on the streets but in proper living conditions; not getting out of breath too easily, e.g. asthma.*

Adolescents' opinions change as does their dependence on adults. They become more influenced by, and attach more importance to, information gained from peers, magazines and television. They also begin to question information and ideas, particularly the attitudes and beliefs of their parents.

From my discussions with the latter, it appears that they feel ill-equipped to cope and are often too embarrassed to discuss personal matters with their offspring. One parent said:

> *It's embarrassing to talk to your own children about sex; it's better if somebody else does it.*

Others were painfully aware of their own ignorance:

> *They know more about it [sex] than we do.*
>
> *I can't answer the kids' questions, we never did anything like that when we were at school.*

Doctors meet many parents in such situations. One doctor said:

> *Parents come to me in a state because they feel unable to cope with the problems of developing children.*
>
> *Esther Rantzen has done more to get people off Valium® than anything I have ever said to them [talking about the influence of TV on health behaviour].*

Out of concern, parents and doctors look to schools for help. Unfortunately, one doctor felt that this was a very unfruitful process:

> *I don't know anything about the health education courses in local schools. I would like to be involved but have never been asked.*

However, the child's view of school and of teachers does not seem to be at all conducive to a successful outcome. Much has already been written about the 'hidden curriculum' and the implications of

teachers' behaviour outside the classroom, yet many teachers seem to be unaware of how children perceive their actions and how important a part they play in determining how children behave.

In terms of health behaviour children are very impressed by people whom they see as 'experts', e.g. doctors and nurses, but although they may see teachers as experts in their subject, e.g. physics or maths, this does not include health. As a result they are suspicious of information that they receive in school, perhaps because it conflicts with that received from other sources or perhaps because they suspect the motives behind it and they don't see teachers as caring adults.

Many children see health messages being used as weapons of control both by teachers and parents. Authority does not wish children in school to smoke and so a talk about the health hazards involved is used to reinforce the order not to smoke. Too often the health messages and/or the no-smoking orders are being given by staff who are known by the children concerned to smoke. This, together with unfortunate remarks like, 'I don't care what you do outside school . . . ', helps to convince the children of teachers' lack of concern and questionable motives.

Since many children don't smoke, most girls don't get pregnant, most take some exercise and have healthy lifestyles, it would be fair to surmise that many children do receive effective health education through a variety of avenues. These include the community, parents, doctors, magazines and books, but very few of these children suggest that school or teachers have been instrumental in shaping their behaviour. One 17-year-old girl said:

> *You are the first person who has talked to us in school about health.*

Government and society tend to ignore the majority and instead they highlight, at every opportunity, the worrying trends in the health behaviour of the others and look to schools to reverse these tendencies.

Educators are then left with the question of what children need to make their health education effective. The answer to this will be different for every child but I would suggest that there are certain principles to be remembered.

My research has shown that children bring a great deal of health knowledge to the lessons with them. This is true of children at all ages and ability levels and should be a major factor in any subsequent learning. The message for the teacher seems to be very clear: that he should investigate this knowledge before attempting to build on it. I am sure that teachers will find inaccuracies and contradictions, but these in themselves can prove to be useful starting points. This approach suggests a need to talk *with* children, not *to* them, and this demands a style of approach which is uncommon in secondary science lessons.

Children need to be given the skills necessary to select from, and to analyse the health information that they receive, and then to make considered choices on the basis of this information. This involves looking at the implications of decision making both for individuals and for their associates. They need a chance to discuss the issues involved and it is the responsibility of the teacher not only to teach the necessary skills but also to provide the framework for this discussion to take place.

The youngsters need their beliefs to be challenged in a non-threatening way, perhaps by their peers, and through this process they must learn to use reasoned arguments and develop tolerance of other people's views which may be different from their own.

Much has been written recently about health education which gives children the skills and the freedom to choose their own course of action. Few people would argue with such an approach but my work shows that children have a different perception of this. They do not see any freedom to choose, rather a directed choice to a predetermined goal, and under such circumstances consider it to be a waste of time to talk about choice. If it is an instruction, then, 'Why don't you just tell us, it's quicker?' seems to be the general response.

From my findings I would suggest that at present, we teachers have little or no positive effect on the health behaviour of the vast majority of our pupils and that the ad hoc arrangement that prevails in most schools is totally unsuitable. If we are to make school-based health education effective then major changes are necessary both in the philosophy of the schools and in the structure of the curriculum. My recommendations follow in Boxes 21, 22 and 23.

If LEAs are to help schools perform more effectively in health education, they must do the following:

1. take the lead by producing clearly expressed policy statements on health education which state aims and objectives, as well as giving some idea of course content;
2. back words with actions by promoting more healthy environments in schools, e.g. school meals;
3. issue the policy statement to all parties involved, i.e. parents, doctors and the community, as well as the schools;
4. provide the support, finance and training necessary to bring about the implementation of the LEA policy.

Box 21 *Suggested action for LEAs*

If schools are to perform more effectively in health education, they must take the following action:

1 agree the content of their health education courses with the authority;
2 appoint members of staff to coordinate the cross-curricular course and to be responsible for its teaching;
3 support the course from a management level and so recognise its importance;
4 examine the 'hidden curriculum' within the school and produce a whole-school policy on health which includes staff as well as pupils;
5 transmit details of the course to outside bodies and perhaps use local press and radio to highlight the course.

***Box 22** Suggested action for schools*

If teachers are to become more effective as health educators, they will need to act as follows:

1 move away from the mainly content-based courses which exist at present;
2 develop skills in children such as being able to analyse data, test ideas, solve problems and make informed choices;
3 develop courses which build on existing knowledge, giving due regard to children's ideas and beliefs;
4 encourage productive discussion in the classroom;
5 show children the limitations of science and help them to realise that 'prevention may be better than cure'.

***Box 23** Suggested action for teachers*

SECTION SIX

What methods do teachers use?

What techniques are commonly in use in health education?

Some of the methods which health education teachers use in, for example, personal and social education lessons, may not be adaptable to science lessons, whilst others are entirely inappropriate for science education. However, many of these active learning techniques are useful approaches in any subject.

In the report *Health Education in Schools and Teacher Education Institutions* (**3.2**), primary and secondary schoolteachers of health education were given a list of 13 teaching techniques and asked to rank them for appropriateness to health education skills in initial teacher training on a five-point scale from 'strongly agree' to 'strongly disagree'. The results are shown in the table on page 38, in rank order.

The table indicates what teachers thought should be included in courses for trainee teachers. The question we must ask ourselves is: how common are such techniques in the everyday practice of science teachers? In the Curriculum Guide **Better Science: Approaches to teaching and learning**, in this series, a wide range of techniques is described as being appropriate to science teaching. It would not be fair to say that they are all commonly practised by science teachers, however. But we also believe that the approaches described in this section are by no means only appropriate to health education, but also have a part to play in making learning more active and participatory in science as well.

What are we trying to achieve in health education and science education?

Put differently this question might be: what are our aims? Our definition of health, given at the beginning of Section 1 under 'What is health?', serves as a broad general aim for any course in health education.

In science lessons, we are also attempting:

1 to study those aspects of science that are essential to an understanding of oneself and of one's personal well-being;
2 to enable young people to discuss, reflect upon and evaluate their own personal understanding of key scientific concepts, theories and generalisations.

In trying to achieve these aims, we are mindful of the recommendations made in Case Study 8 (Box 23, Section 5). We now go on to look at the methods used by teachers of health education.

Health education: solving problems

Several Groups in the Review have produced work on solving problems. The first example, by the Avon Group explores how to help young people examine the additives in ice lollies. The second, from Hertfordshire Health Education Group (**1.6**), shows a sample lesson on death education (Box 24).

Primary Schools					Secondary Schools				
		Percentage SA	A	Comb.			Percentage SA	A	Comb.
1	Project work	23	65	88	1	Discussion/small group work	54	34	88
2	Discussion/small group work	32	52	84	2	Using audio-visual materials	45	40	85
3	Using audio-visual materials	24	57	81	3	Group work	28	50	78
4	Group work	18	62	80	3	Community visits	25	53	78
5	Community visits	20	56	76	3	Decision making	36	42	78
6	Thematic work	18	57	75	6	Problem solving	28	45	73
7	Problem solving	13	49	62	7	Thematic work	16	54	70
8	Decision making	15	47	62	8	Team teaching	23	40	63
9	Self-directed learning	10	47	57	9	Project work	11	51	62
10	Role playing	9	39	48	10	Self-directed learning	20	40	60
11	Team teaching	6	36	42	11	Role play	14	37	51
12	Value clarification	6	30	36	12	Value clarification	18	31	49
13	Simulation gaming	5	25	30	13	Simulation gaming	9	31	40

Table 3 *Ranking of teaching skills which should be featured in initial teacher education by combining* Strongly Agree *with* Agree *scores for primary and secondary schools.*

(*Reproduced from* Health Education in Schools and Teacher Education Institutions, **3.1**)

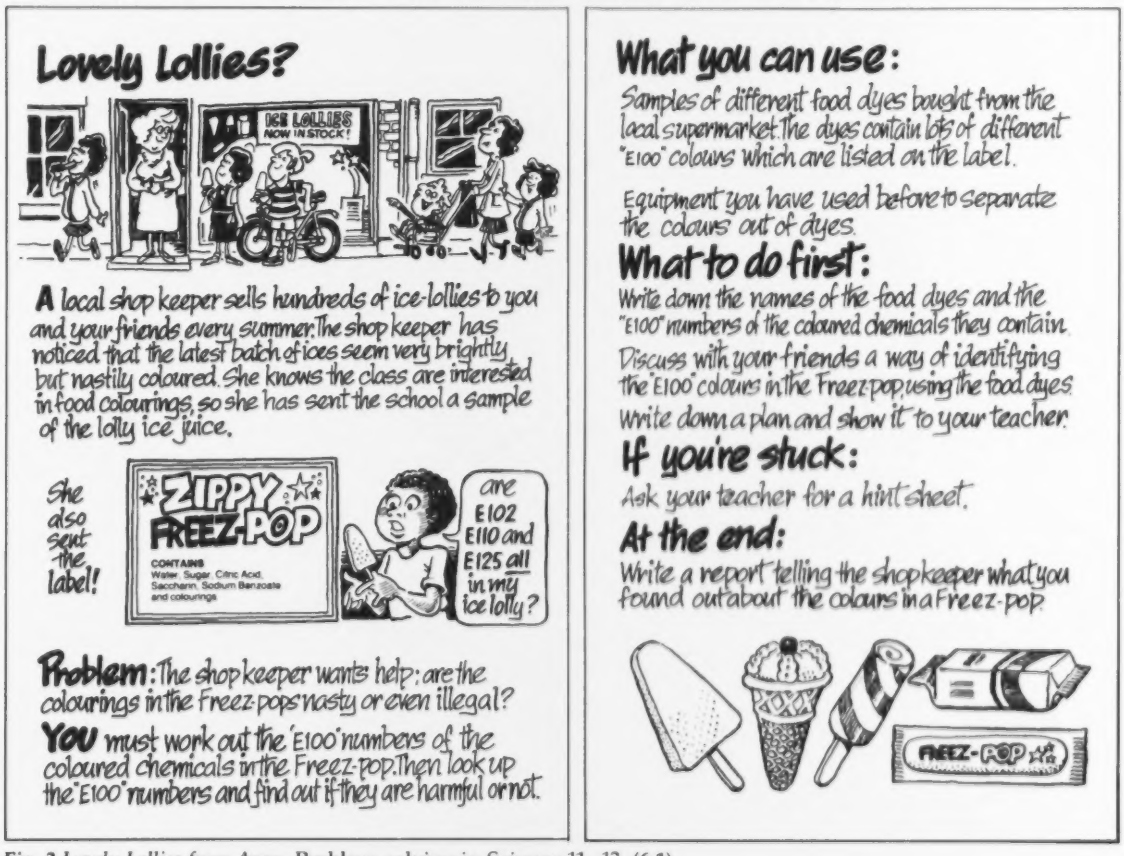

Lovely Lollies?
ICE LOLLIES NOW IN STOCK!
A local shop keeper sells hundreds of ice-lollies to you and your friends every summer. The shop keeper has noticed that the latest batch of ices seem very brightly but nastily coloured. She knows the class are interested in food colourings, so she has sent the school a sample of the lolly ice juice.
She also sent the label!
ZIPPY FREEZ-POP
CONTAINS Water, Sugar, Citric Acid, Saccharin, Sodium Benzoate and colourings
are E102 E110 and E125 all in my ice lolly?
Problem: The shop keeper wants help: are the colourings in the Freez-pops nasty or even illegal?
You must work out the 'E100' numbers of the coloured chemicals in the Freez-pop. Then look up the 'E100' numbers and find out if they are harmful or not.
What you can use:
Samples of different food dyes bought from the local supermarket. The dyes contain lots of different "E100" colours which are listed on the label.
Equipment you have used before to separate the colours out of dyes.
What to do first:
Write down the names of the food dyes and the "E100" numbers of the coloured chemicals they contain.
Discuss with your friends a way of identifying the 'E100' colours in the Freez-pop using the food dyes.
Write down a plan and show it to your teacher.
If you're stuck:
Ask your teacher for a hint sheet.
At the end:
Write a report telling the shop keeper what you found out about the colours in a Freez-pop.
FREEZ-POP

Fig. 3 Lovely Lollies from Avon, Problem-solving in Science 11–13, **(6.1)**

The sample lesson takes a problem-solving approach to death education, using discussion groups and reporting sessions. Figure 4 shows a network used by the group to help structure teaching of the topic and its relationship to other topics.

Health education: developing skills

There are many skills which apply equally to health education and science. We outlined these in Section 3 (see Box 9). We shall not cover all of them here, but merely give a selection of methods to show how teachers have developed these within working groups. One of the areas of work designated for covering in science was that of communication. Several skills are involved in communication and one SSCR Working Group, from Devon, chose to look at developing listening skills.

Materials needed:

lesson outline;
newspaper report;
copies for each group of the following sections of the case history: the recipients of the transplanted organ, man's wife, girl's mother, man's children, girl's father/parents;
OHP (E) the surgeon's report.

The lesson provides an example of how a case-study approach can be used in a problem-solving exercise. It is designed as an introductory lesson to a module on 'death' and uses the question of organ transplanting. Death has been chosen because it is rarely studied in schools. You are now cast in the role of pupils about to start the lesson. Try to imagine that you are 14- or 15-year-olds who have already learnt something about the kidney and its function in science lessons.

Outline of introductory lesson for death module

The following is an outline of the lesson, with the time to spend on each part:

(a) Donor accident and parental response given as a newspaper report.
Read to class and establish the idea of a kidney being available for transplanting (5 minutes).
(b) Divide into smaller groups for discussion (about six per group suggested). Ask each group to elect a representative.
Hand out case history about the two recipients.
Group discussion — 'Who do you think should receive the transplant?' (5 minutes).
(c) Report back session — collect groups' decisions (5 minutes).
(d) Give further information — man's wife, girl's mother (5 minutes).
(e) Report back session — 'What do you think having heard the relative's view?' (5 minutes).
(f) Give final information — man's children, girl's parents (5 minutes).
(g) Final report session — 'What do you think now?' 'If you were the surgeon, what would you decide?' (5 minutes).
(h) Show OHP of surgeon's decision. Closing discussion (5 minutes).

Total: 40 minutes

Box 24 *Sample lesson on death education from Hertfordshire*

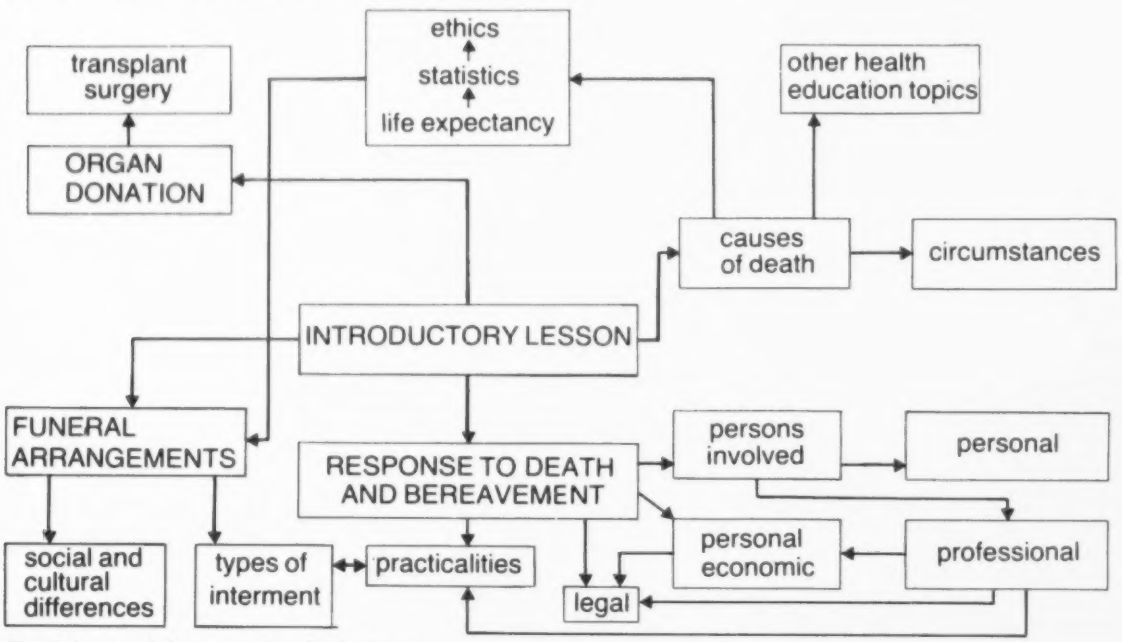


Fig. 4 *A network for structuring death education*

Distractions

This exercise is aimed to introduce the pupils to the value of being able to listen. By the end the pupils should be able to distinguish between listening and hearing. Listening means taking in information, storing, analysing or evaluating the content. There are a number of reasons why people fail to listen to what they hear. Distractions may come from the immediate surroundings, from inside the listener or from the speaker. If the listener feels threatened or concerned by what is said he may focus on his own feelings rather than what is being said. He may have a different viewpoint and start to work on his response before listening and miss essential points. The listener can be preoccupied with other issues and 'switch off'. Other listener distractions can be appearance, mannerisms and even personality. Pupils should recognise listening as a skill which can be improved.

Activity

Target group: first- and second-year secondary pupils.

Resources: 1. Suitable stories in science at the most one or two pages long. 2. A suitable range of questions relating to the passage.

Suggested procedure:

(i) Read the story/passage to the class and introduce distractions. Choose from a range: personal mannerisms; dress; actions (such as scratching); aggressiveness or external distraction such as a radio, technician working, having something in your hands or on the bench. There are endless distractions!

(ii) (a) Children answer questions about the story/passage.
(b) Discussion of correct answers.
(c) Draw up a list of reasons for the lack of accuracy in responses. Aim to isolate distractions, distinguish between listening and hearing.
(d) Draw up a list of suggestions on how to improve personal listening and hearing. Aim to draw out: concentration on speaker; identify subject; think about what is being said; respect speaker, put yourself in his place.

(iii) Read out a second story/passage. Pupils answer questions. Check to see if there is any improvement in performance.

Uses/extensions

- Use a shortened version to introduce a topic: water, air, etc.
- Get a pupil to read what the group has produced in practical work.

***Box 25** Sample lesson on learning to listen (from Devon* A Skills Approach to Science Teaching, **6.2**)

Type of injury received from glass bottle accidents

	Age of victim (years)									
	0-4		5-16		17-59		60+		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Cuts/lacerations	140	18.9	113	15.3	251	34.0	55	7.4	559	75.6
Bruises/contusions	9	1.2	5	0.7	16	2.2	1	0.1	31	4.2
Fracture	0	—	1	0.1	11	1.5	18	2.4	30	4.1
Poisoning/suspected poisoning	23	3.1	3	0.4	2	0.3	2	0.3	30	4.1
Tenderness/swelling	6	0.8	4	0.5	15	2.0	4	0.5	29	3.9
Other	8	1.1	18	2.4	23	3.1	9	1.2	58	7.8
Unknown	0	—	1	0.1	1	0.1	0	—	2	0.3
Total:	186	25.2	145	19.6	319	43.2	89	12.0	739	100.0

nb: percentages are accurate to one decimal place.

Sample questions on table:

1 Which type of injury is most common in accidents involving glass bottles, across all age groups?
2 What sort of medical supplies are likely to be of most use for treating injuries caused by glass bottle accidents?
3 Can you think of any questions worth asking the rest of the class regarding the above table?

***Box 26** Glass bottles: A lesson on safety (from Staffordshire)*

The skills of analysis of data and interpretation of arguments have been quoted as being very important for youngsters to develop if they are to make decisions.

The SSCR Group Staffordshire (Box 26 and Box 27) concentrated their work on the development of a process-based approach to health education through aspects of safety (*Heath education: aspects of safety – a modular approach*, **3.3**). Their work shows clearly how young people can be encouraged to look at data and begin to use them to develop scientific investigations of their own by being given control of their own experiments.

Alternative approach

Test 1 How strong is a microscope slide?

Suggestions:

1 Using force meters to pull on them until they smash.
2 Dropping objects on them.

After discussion all groups decided on Option 2 as it seemed a safer method. (Somewhat of a pity that we have not yet had time to pursue Option 1 or any other options which may be suggested by other groups of children.)

Apparatus:

Microscope slides, mass of, and mm ball bearings, metre rules, plastic boxes to hold slides (although shoe boxes will do), plastic sheet to cover the box, Blu-tak® to hold slide in place.

Suggestion:

Allow children to arrange the apparatus as they see fit (within the bounds of safety). Clamps, stands, etc. soon become obvious necessities to most children.

Results:

Height of bearing drop (cm)	Test 1	Test 2	Test 3
10			
20			
30			
40			
50			
60			

Examples:

Problems as the height continues to increase, the accuracy of the drop becomes critical. How do we overcome this?

Suggestions:

1 a shute slanted;
2 vertical tube to guide the bearing.

The merits of each and their design (rolled sugar paper) and results all proved productive to both discussion and thought.

***Box 27** Microscope slides: lesson on safety (from Staffordshire)*

Health education: role play

The Belfast SSCR Group (*Approaches to the teaching of genetics* (3.3)) have produced several ways of teaching genetics. They say:

> ***Information about genetics presented in an emotional vacuum is likely to be useless because enlightened decisions are only possible when factual knowledge is considered in the light of its applications.***

Here is a synopsis of their view of role play in the context of genetics (Box 28) followed by an example of the use of role play (Box 29).

Perhaps the most common form of role play is the 'acting out' of situations. This type of activity is very controlled and useful with difficult groups. It allows the teachers to control the situation and set the limits. It can provide a good starting point for discussion, but often children tend to 'rent' the teacher's ideas rather than producing their own, since it is tightly structured. Two methods are usually used.

1 *Role play* (a) All members participate, each being given a role and a synopsis of the situation.

   Role play (b) Goldfish-bowl technique. This also involves prescribed roles, but some of the roles are those of observers. The observers are there to look at the emotions and dynamics of the role play and can serve a very useful function in terms of analysing the group relationships. Debriefing is very important after such a role play to allow the relationships agenda to be aired.

2 *Simulations* These are particularly useful when dealing with very small objects such as blood cells. Playgrounds can be used to simulate the circulatory system in which the youngsters play the blood cells.

3 *Theatrical drama* This is a technique for exploring scientific concepts through the medium of drama. It is now promoted as a drama festival through the BAAS.

4 *Educational drama* This is a wider-ranging technique than role play, although it employs people in roles from time to time. It is less restricted, everyone has a part and the teacher and group are seen as a creative partnership developing the ideas as they go along. At any time, the teacher may stop the drama to suggest that everyone come out of role to discuss what has already occurred. Educational drama can be a useful tool for exploring issues both cognitively and affectively.

***Box 28** Types of role play (from Belfast)*

This exercise provides an opportunity to examine the effects of a potentially lethal, sex-linked disease on the everyday lives of a family and the influence that the family's experiences may have on the decisions which a young couple about to be married may be faced with regarding pregnancy, amniocentesis and abortion. Before participating, the students would have had access to relevant information on haemophilia.

The characters

Janet Smith is an active, normal young woman aged 18 years, engaged and planning to be married in six months' time. She works as a nursery assistant in a local school and is very fond of children. She would like to have several of her own. She has assisted her parents in looking after her brother, John, who is a

continued on next page

haemophiliac, and is aware of the difficulties encountered by the family both during emergencies and in everyday routine.

Ken Black is Jane's fiancé. Neither he nor any member of his family has suffered from haemophilia and he has only become aware of its effects since getting to know Janet. He is a draughtsman, due to complete his apprenticeship soon, and he hopes that in two years' time he and Janet will be ready to have children of their own. He does not disagree with the idea of an abortion but considers it to be a dangerous operation.

John Smith is 16 years old, bright and cheerful, popular at school, a talented pianist and mathematician. He leads a normal life as far as possible, although he suffers from haemophilia which has meant extended periods of time in hospital as well as daily injections of a clotting factor. Recently he gained a place at a school specially run for haemophiliacs which has a hospital unit nearby used to dealing with these pupils. He hopes to go to University to study music and would very much like to become a conductor some day.

Betty Smith is the mother of Janet and John. She is a quiet person who has had to learn to cope with the difficulties of looking after John, having lost her own younger brother through haemophilia when he was only four. She is concerned that Janet would become too distressed to cope with a haemophiliac child.

Sarah Browne is Janet's grandmother. She has had seven children, one of whom died of haemophilia when he was four. Her other two sons and four daughters were not affected. She has 23 grandchildren, of whom three are haemophiliac grandsons.

Alec Smith, John's father, has been the mainstay of the family throughout John's life. He is a taxi driver who has sometimes had to rush John to hospital during emergencies. A few years ago, he turned down an opportunity to take up a job as a long-distance haulage contractor to remain near John. He normally gives John his injections.

The scenario

Janet and John have been having their Sunday dinner with Janet's family. Now, in the sitting room, the conversation has turned to the subject of haemophilia . . .

***Box 29** Haemophilia role play (from Belfast)*

Health education: computer-assisted techniques

We can only refer briefly here to the work of Groups, and urge readers to examine the Groups' work in the archive, *Arches* (**3.3**).

The work of the Association for Science Education (ASE) Group on health-related fitness (*Computer programs for monitoring fitness* is a study (**3.3**) which uses computer simulations to encourage youngsters' understandings of the physiologically related issues of fitness. Youngsters measure heart rate, blood pressure and breathing rate before, during and after exercise while their body functions are measured by the computer. These records can be stored over a period of time to show changes with different types of exercise and be used as the basis for data analysis work.

The Belfast SSCR Group has produced some work on the applications of germ theory. Their work is a simulation/problem-solving exercise which enables youngsters to alter the conditions in which food is left in a kitchen. The programme shows changing bacterial growth as a result of their choices.

Both of these programmes have obvious links to the work of other school departments and demonstrate how cross-curricular health education can be made more accessible to pupils. For further information we recommend Section 3 of the Curriculum Guide **Better Science: Approaches to teaching and learning**.

Health education: discussion groups and small-group work

The earlier example from Hertfordshire (**1.7**) gives some idea of how these might be employed, as does the Introduction to this Guide. However, we shall now present an example (Box 30) to illustrate how to cope with a problem which is a common one in health education but is not necessarily featured in the work of any one Group, that is the problem of how to start where young people are.

Cancer: what does it mean to you?

The lesson focuses around drawings. The young people are asked to draw what cancer means to them. The two photographs on page 43 show some of the ideas 14-year-olds have on this topic.

The youngsters are then divided into pairs. They are given an instruction sheet which asks them to do certain exercises:

1. They are asked to look at each other's drawings and to tell their partner what they think the drawing means. Their partner then explains what they were trying to convey. They finally compile their list of 'ideas about cancer' which have arisen from the discussion.
2. With their list they move into groups of four. They compare lists with the other group and produce two sets of statements:
   (a) 'things we know or think about cancer';
   (b) 'things we're not sure about and want to know'.

continued on next page

Fig. 5 Images of cancer

3 Using this, they then plan a series of lessons which they think would help them to understand the answers to their questions.
4 Finally one member of the group of four is asked to report back to the whole class what their lesson plans were. Report-back can be by drawings, verbally, or by acting out one of the lessons.

***Box 30** How to start where the children are (Hertfordshire)*

This discussion involves explanation, description and forward planning by young people and also gives the teacher some insight into their previously held ideas, from both an emotional and a conceptual point of view.

Health education: using audio-visual materials

This work is drawn from an example (Box 31) provided by Alan Prout and Shirley Prendergast of the Health Studies Unit at Cambridge University. As with all audio-visual techniques, careful preparation of the material by the teacher is essential. That includes preparing the youngsters for what they are to see, deciding which part of the film they are to look at — if the whole is not to be

shown — and planning follow-up work carefully. In this example, the discussion *precedes* the film.

Visual aids: what do you want from them?

1 The youngsters are divided into groups of five or six. They are told that they are groups of researchers who have been commissioned to make a film about acquired immune deficiency syndrome (AIDS). They are asked to spend 15 minutes planning the outline for the film. The areas of the outline can be structured around:
   - presentation;
   - story line;
   - approach.

   The pupils are asked to write their outline on a large piece of paper.
2 At the end of the 15 minutes, one member from each group reports on the outline to the whole class, and the paper is stuck up for everyone to see.
3 The class then watch the film.
4 Small-group discussions are held after the film to see how closely it matched with their expressed needs, what they learnt from the film, and how they would change their outline in the light of the information in the film.

***Box 31** An example of using audio-visual material*

Health education: designing and deciding skills

This example is taken from a group in a north-west school who were not a formal working group in the Review. They taught only that part of their sex education course dealing with secondary sexual characteristics to mixed-sex groups of first-years in science, to lead on directly from the experiences which the youngsters had had in their junior schools in aspects of sex education. They taught about the menstrual cycle first and then, as part of the science practical, used the lesson in Box 32.

1 The youngsters were divided into small groups of three or four.
2 They were given advertisements for sanitary towels of various kinds and a sheet of information about a young girl. They were asked to advise her as to which sanitary towel might be the best for her to use.
3 When they had made their choice, they were asked to record upon what basis the choice was made, and then set the problem that different absorbencies of sanitary towel cost different amounts of money. How could they find out what the difference was between the absorbencies?
4 The teacher had already cut up sanitary towels into squares or tubes of the same size. Youngsters were given hint sheets to help them with the problem if they needed them. Most of them then conducted timed absorbency experiments on the samples.
5 They were asked to record their results, and in the light of them, look back at the advice they had given the girl. The group were then given four questions to discuss.
   - Would they change the advice?
   - If so, how?
   - What basis would they use for the advice now?
   - What had they learnt about the validity of advertisers' statements?

***Box 32** What does 'super-plus' mean?*

SECTION SEVEN

Assessment in health education

In this section, we shall look at one aspect of investigating success: namely, assessment. Assessment is a term that is commonly confused with evaluation in everyday usage. In this section we take assessment to mean: 'the monitoring of an individual's learning progress'.

In the first part of this section, we shall discuss how to go about assessing the achievement of youngsters in health education, with particular reference to science. We do this by investigating the purposes, content and types of such assessment and the practices which occur at present in both school-based and external examination-based assessment, and then we look at what science teachers might usefully do in such areas.

Why assess?

The question of why to assess is not easy to answer. Is the purpose:

1 to find out how much youngsters have learnt about the facts?
2 to identify where their strengths and weaknesses are?
3 to help the teacher to reshape parts of the course?
4 or any one of several other possible purposes?

Macintosh and Hale (7.1) list six reasons for assessment in schools. These are defined in Box 33.

1 *Diagnosis*—assessment of groups or individuals to identify strengths and weaknesses of them and/or the course.
2 *Guidance*—assessment to provide information to help individuals make decisions and choices.
3 *Selection*—using assessment to identify individuals who fulfill certain criteria.
4 *Grading*—using assessment to compare individual performance with some defined standard.
5 *Evaluation*—assessment of the value and success of a course.
6 *Prediction*—using assessment information to indicate an individual's potential.

***Box 33** The reasons for assessment in schools* (see 7.1)

These six reasons for assessment do not have equal importance in health education. Anne Jones and Faith Hill, in their comprehensive report *Assessment of Pupil Achievement in Health Education* (7.2) compiled case studies of health education assessment in seven schools in the south of England. They quote the teachers they interviewed as regarding diagnosis, evaluation, guidance and grading as being the most important reasons for assessing youngsters' achievement in health education. However, the teachers interviewed also perceived other reasons for assessing health education within the context of a school community. Many of the quotes they give in support of this seem to point out that teachers see assessment in health education lending some kind of credibility and status to the subject in the eyes of other staff, the youngsters themselves and the Headteacher.

> *Our Head is very keen for general studies (of which health education is an element) to be assessed because otherwise the pupils don't think it has any value, do they?*
>
> *If you're going to have credibility and status as a subject, then you need to do O levels and CSEs.*
>
> *It wasn't... it's not to give it status and yet, perhaps in the eyes of the children, they can see, for example, that they are graded. It can motivate the children.*

It is important to realise that Jones and Hill's survey was primarily concerned with assessment of health education across the *whole* curriculum and not simply as a part of the teaching of more traditional subjects. The status of science is unquestionably very high. Thus, science teachers have no need to use assessment for the purpose of lending credibility to their subject. However, they may not see any reason for assessing health education within the framework of science education. Many science teachers take the stance that if science courses teach youngsters about their bodies, and this knowledge is assessed, then since body knowledge is part of health education they will be assessing health education anyway. But, is there a reason for assessing health education as a subject within the framework of science? To answer this question, we must re-examine the six reasons of Macintosh and Hale: *diagnosis; guidance; grading; selection; prediction* and *evaluation.*

Diagnosis means being able to pinpoint the strengths and weaknesses of an individual's performance in order to enable her or him to improve. Science teachers often have this as the purpose when assessing practical skills. As we stated in Section 3, there are skills which health education and science education have in common. These include analysing information and making decisions. We want youngsters to develop their

competence at these skills if their health education is to be of value to them in their life outside school.

Guidance usually implies using an assessment to help youngsters identify those areas of competence that they might want to use either in a career or as a basis for personal development. In the latter case, guidance could be seen as part of health education since it would be instrumental in promoting high self-esteem. In a science-for-all curriculum, guidance would be useful only in the fifth year, to enable pupils to make choices about their future.

Grading implies using assessments to compare individuals with some kind of standard. Certainly this will be very much the focus of the General Certificate of Secondary Education (GCSE) assessments. It will enable us to determine the levels of understanding that youngsters have reached, and help us to see whether our courses are helping youngsters to achieve the skills they need for decision making. However, there are problems with final external assessments and grading in health education. Many aspects of health education are emotive, and these are not areas in which young people ought to run the risk of being labelled potential failures.

Selection in terms of science for all up to 16 would be only a very minor aspect of science, and of little value in terms of health education.

Prediction would indicate those persons who would benefit from more practice at particular aspects of a course, or who have progressed so well that they might be potentially useful group members for assisting their peers. How does prediction apply to health education? If science teachers are assessing the scientific aspects of nutrition, is health education necessarily being assessed as well? In a limited way, yes. But *only* in a very limited way, if the application of the knowledge is not assessed — for example, by asking pupils to compose different menus, suitable for families from different cultures, within a price limit. In other words, as in other aspects of science, merely assessing understanding is not enough. Youngsters' skills in *using* their understanding are all-important. If the overall aim in science is to develop in youngsters the competence to use their knowledge, then the purpose for assessing health education in science becomes clear, because health education is a relevant context for the use of scientific knowledge.

What to assess?

The easy answer to the question of what to assess is 'the content of the curriculum', bearing in mind that our definition of content is one that includes not only the topics youngsters learn about, but also the processes by which they go about it and the attitudes they hold. However, on a more careful analysis of the question, it is obvious that there is not an easy answer. An SSCR Central Team paper (**7.3**) said:

> *We find it inappropriate to specify what should be assessed, for by so doing we should fall into the trap of appearing to dictate the curriculum.*

That document and others are firm in their conviction that what should be assessed in any course is the extent to which the aims and objectives of the course are being met. Since we take the view that science teachers and their pupils should decide upon these aims and objectives and how they are to be assessed, we do not intend to make recommendations about objectives and assessment. What we shall do is to show what some teachers of health education *are* assessing.

Inevitably, within the framework of science, the aspects that are assessed most frequently and rigorously are those which are concerned with the knowledge of the working of the human body, that is, youngsters' cognitions. In (**7.2**) teachers are quoted as saying that there were three major areas of health education which ought to be assessed. These were:

1 basic knowledge of health-related facts;
2 skills such as informed decision making and working in groups;
3 attitudes such as positive self-esteem.

The teachers expressed concern about the difficulties they experienced in trying to assess both skills and attitudes meaningfully, let alone objectively, and indeed about their right to assess attitudes at all. This implies that, in health education, despite teachers' best intentions, much of what is being done in schools remains at the level of assessing the knowledge youngsters have gained. The same could be said of many science courses, although some Review Groups have made considerable progress in aspects of assessment of skills and attitudes in science education.

REFLECTIONS

How are skills assessed within your teaching?
Do you have strategies for assessing attitudes to science and health education?
Are aspects of health education overtly assessed in your science lessons?

How we go about *conducting* our assessment is another matter still. There are two major types of assessment: summative and formative (Box 34).

1 *Summative*—this is assessment typified by external exams, that is, a final assessment taking place at the end of a course.
2 *Formative*—this is a continuous assessment. It is often used to give information to parents or feedback to youngsters about their progress, e.g. a pupil profile which continues from the first to the fifth year.

Each of these types of assessment can be one of the following:
1 *Norm referenced*—this means ranking individual performance against such standards as the national group, school group, class group, or sets within a class.
2 *Criterion referenced*—this means comparing individual performance with predetermined standards set by the school, teachers, youngsters, parents, or any other reference group.

Box 34 *Types of assessment*

Our discussions with teachers have inevitably been coloured by frequent worries about just one type of assessment, namely the summative, norm-referenced assessments that are implied by external examinations. The debate about the extent to which examinations either further or hinder education is an interesting one. There is no doubt that the material being assessed in examinations will continue to include health education topics, but examinations are only one method of assessment, and should not be relied upon exclusively.

As Jones and Hill (**7.2**) say:

> *Informal, day-to-day classroom assessment is not perceived as important and is classified as no assessment. Only formal, examination-type assessment is considered as 'real' assessment.*

This implies that formative assessment for the purposes of diagnosis, or reporting to parents, appears to be an ad hoc process which teachers do not construe as being 'real', or in some way think of as having less value than examinations. However, summative end-of-course exams, based upon norms set for 16-year-olds, are of little value in helping 12-year-old youngsters discover their weaknesses — say, in analysing information or evidence on the value of fibre in their diet. We would want them to be able to improve at the skill of analysis, so we need to use the information gleaned in a formative assessment to help them form an evaluation of their strengths. Such formative assessments should be part of a continuous process, and in no way are less valid, formal or real than summative assessment. They can be based on criteria designed by youngsters, or teachers, or parents or all three in cooperation (criterion-referenced). As we said earlier, formative, skills-based assessments have become an important feature of science courses within the Review, often using a criterion-referenced format.

What is happening in assessment in school health education now?

The Jones and Hill report (**7.2**) outlines in its case studies and questionnaire analysis the types and methods of assessments and the use being made of those within the schools. They *suggest* methods ranging from teacher observation, peer observation, discussion work and counselling, tests of knowledge and understanding, creative work and self-assessment by pupils. Types *in use* by the schools include formative pupil profiles, criterion-referenced, skills-based assessment and summative examinations.

However the assessment is conducted, it is the use made of it by teachers and pupils that is important. Jones and Hill's report asked teachers what use they made of their assessments, and the results (Table 4) show great differences between schools in the use of assessment of health education.

(i)	Used as part of a basis for parental report writing.
(ii)	To predict pupils who may be eligible for further health education-based courses.
(iii)	To determine which skills e.g. data handling, communication or discussion pupils have mastered.
(iv)	To determine pupils' attitudes towards health education topics.
(v)	To determine how well pupils have learnt/understood the course material.
(vi)	As the basis of some form of certification of achievement in this area (excluding public examinations).
(vii)	For teachers to use to identify pupils with specific learning difficulties.
(viii)	To allow pupils and teachers to discuss course materials and individual progress.
(ix)	Improving pupils' self-image of progress — (pupils' own sake).
(x)	Others; please specify. Self-assessment/evaluation Developing a critical awareness in pupils Effort

Table 4 *Use made of assessment*
(Data taken from **7.2**)

These results indicate that assessment in science is making only a minimal contribution towards helping youngsters to gain and progress in health education in a formative way. As Jones and Hill say (p. 12):

. . . there is the question about the quality of health education which is promoted through option subjects. It has been referred to as health-related teaching because its focus tends to be much more closely associated with the subject through which it is taught than with health education in its wider sense.

As far as a *traditional* curriculum in science is concerned, we can well understand that the assessment reflects the priorities of knowledge and understanding. However, the aims of the Review are such that knowledge transmission, be it of health-related issues or of science, is no longer going to be enough. Thus, whilst the Jones and Hill report covers some current practice, the Review from a science base can bring other evidence to bear which suggests that the science being taught in Review Groups, and the methods of assessment being used, are much more conducive to high-quality health education teaching than was ever the case previously. Review science teachers are keen to assess skills and attitudes in health education and science education in both formative and summative ways, as well as the knowledge bases of subjects. If further evidence were needed, the Jones and Hill report itself quotes the example of Stone school for girls, in which a profile type of formative assessment is being planned, based upon the one *already operating in science* which uses a criterion-referenced, skills-based profile of performance, regularly discussed by the department to ensure some measure of standardisation. Such evidence shows that in science, teachers do know that profiles can contribute to assessment and teaching in health education in ways which produce good quality.

REFLECTIONS

What strategies are there for formative assessment throughout the five years of science education young people have in your school?

Are the young people themselves involved in this formative assessment?

Are parents involved in the formative assessment?

Do parents know what is being assessed in science?

How are the products of formative assessment used?

What about external examinations?

Jones and Hill (**7.2**) are not optimistic about the assessment of health education in areas other than knowledge: in the proposed GCSE examination.

The GCSE system will allow for Mode 3 syllabuses to be offered. They will, however, either have to conform to the national criteria set for individual subjects or to a set of general criteria . . . It would seem that assessment of affective skills is unlikely to be a major element in most subject-specific national criteria in the most relevant subject areas.

We feel it is particularly important that in respect of summative formal examinations like GCSE, health education remains simply a useful context for — in our case — science teaching which helps to make it more meaningful for young people. We do not feel that it is appropriate for young people to be examined in a summative way in an external examination about health education. We realise that the lack of status of health education has been partly caused by its not being externally examined. However, we would continue to support the view that external examinations of a summative, norm-referenced kind are inappropriate for health education. We need to seek other solutions to the problem of lack of status.

SECTION EIGHT

School assessment: What does the Review have to offer?

Working Groups in the Review have produced a wide range of methods in summative and formative assessment. They have attempted to assess knowledge, skills and attitudes. The assessment of the last two is often by criterion referencing, sometimes by profiling, and includes examples of pupil self-assessment.

It is not our intention to cover the various methods in great detail here. That is the task of the Curriculum Guide **Better Science: Assessing progress**. In this section we highlight aspects of assessment in science that answer some of the criticisms made by Jones and Hill (**7.2**) in the last section. First we look at examples of oral assessment in science, and we follow this by showing how Review Groups have tackled the problems of self-assessment. Our next subsection focuses on profiling in science and health education. Finally we highlight seven priorities for consideration in formative assessment.

Skills-based assessment in science

We begin with an example of oral assessment, which we see as an opportunity to promote self-esteem among youngsters by assessing their own ideas of science. Our example comes from the Hampshire SSCR Group (*Developing alternative assessment for fourth and fifth-year pupils*), **3.3**. Their work was written for fourth- and fifth-year less able youngsters. It is a criterion-based assessment which uses youngsters' communications about their scientific ideas to form the basis of the oral assessment. The three objectives being assessed in this work are:

1 communication of scientific concepts;
2 comprehension of basic scientific concepts;
3 awareness of the contribution of science to the social and economic life of the community.

The novel aspects of this work are that it looks at the youngsters' ability to explain *their own concepts*. The assessment is not intended to discover whether these concepts are the 'right' ones, merely that the youngsters can explain their own concepts in such a way as to make others understand them. This is a novel idea in assessment, because it gives validation to the ideas that youngsters hold and their ability to explain them. It is not testing their 'knowledge' of the correctness of science. (That task, whilst very important, is better done in another way.)

The teachers in the Hampshire Group devised the criteria in Box 35 for assessment of two of the three objectives.

Communication of scientific concepts

5 Can explain his understanding of a concept in such a way that the listener can clearly comprehend what is being explained.
4 Can explain his understanding of a concept so that the listener can comprehend but needs some prompting in later stages, *or* child communicates without prompting but listener only partially understands what is being communicated.
3 Can explain his understanding to the listener who has some comprehension, but needs prompting.
2 Has difficulty communicating at all without prompting.
1 Has difficulty communicating even with prompting.

Comprehension of scientific concepts

5 Can recognise all the major factors of a basic concept in science and their relevant interaction.
4 Recognises some major factors and their interaction.
3 Recognises some major factors and has some idea of their interaction.
2 Recognises only some major factors without appreciating their interaction.
1 Cannot recognise any of the major factors.

Box 35 *Assessment criteria for communication and comprehension of basic scientific concepts (from Hampshire)*

Several other Working Groups have produced criterion-based schemes for assessing skills. They have included in their criteria 'collaborating effectively' (Suffolk's *The Co-ordinated Science Project*, **8.1**); 'cooperation in a group' and 'perseverence' (Hampshire's *Developing integrated science material* **3.3**). 'Data analysis' and 'application of knowledge to problem solving' are criteria regarded as important by Kent and others. Further examples can be found in the **Directory of Resources**.

Self-assessment

Teachers are not the only people who apply assessment criteria in the work of Working Groups. One Group (Hereford, *Science for the least able*, **3.3**) includes, as a part of its assessment for

A. *Yourself*

How well did you work? Answer the following questions about yourself by circling an answer.

1 Did you organise things?	A lot	A bit	No
2 Did you let the others organise?	Yes		No
3 Did you do a fair share?	Yes	More than	Less than
4 Did you do all the best bits?	Yes		No

B. *Others*

How do you feel about the others in your group? Answer the questions about TWO people in your group by circling an answer.

	Name of other person:			
	1 _____		2 _____	
1 Did they boss you about?	Yes	No	Yes	No
2 Did they do their share?	Yes	No	Yes	No
3 Did they have any good ideas?	Yes	No	Yes	No
4 Did you enjoy working with them?	Yes	No	Yes	No

Box 36 *Self-assessment for less able fourth- and fifth-year pupils (from Hereford)*

a unit of work for less able fourth- and fifth-years, a pupil assessment sheet which encourages the youngster to examine her/his own feelings about responsibility for work and others in the group, as well as about the helpfulness of the teacher. It is produced above.

Self-assessment by young people of their progress in knowledge, skills of cooperation and group work play an increasingly important part in science, although they have long been a feature of health education. If we are to encourage young people to develop their skills, then helping them to monitor their own progress in a meaningful and realistic way is an important part of the process of skill development (see Box 36).

Profiling in science

Some of the most exciting work is that being done on profiling in science. In particular, the work of the Wigan TVEI group focused upon a formative assessment scheme which assessed skills, problem solving and attitudes (**3.3**). The course work booklet states:

> *In completing the course, the pupils will have been assessed continuously with respect to attitudes, and personal characteristics essential to successful study, and the formative profiles produced used to develop a summative profile giving a detailed 'picture' of each pupil. The skills and processes continuously assessed over a long period, involving a diagnostic procedure for teachers, ensure a high standard of achievement and a reliable measure of practical ability.*

Table 5 is an example of the profile intended to be negotiated between pupil and teacher.

This piece of work goes some way towards helping teachers to assess youngsters' attitudes and skills. The lack of this type of assessment was the criticism that Jones and Hill (**7.2**) made about health education teaching through the medium of other subjects. Indeed, this example goes further than just attitude and skill assessment. By involving young people in their own assessment, which is given equal value to that of the teacher in deciding what the final assessment should be, young people's self-esteem can be increased — an important goal of health education.

CRITERION	INCREASING COMPETENCE →			
Organisation of file etc.	I can write down most of the notes, results, etc. My work needs putting in order and I find that difficult at times.	My file is mostly in order. I find it difficult to set out my own work from my experiments and my diagrams aren't always clear.	I keep my file in the right order most of the time. Some of my own notes are clear and show what I have down but I don't always do that.	I do keep my file in order and up to date. I explain my experimental work clearly and keep my results, graphs and conclusions for each experiment together.
Safety in use of equipment	I can do most experiements without causing any real damage apart from burning the bench or rubber clamp covers. I sometimes leave my experiment if we are talking, etc.	I can use the equipment but I sometimes leave it to boil dry or tip over, etc. I need to be told which experiments need watching.	I can use the equipment even if it could be unsafe. I rarely leave my experiment but I do need to be told sometimes.	I realise that even simple equipment could be a danger and if I have to leave my experiment I make sure nothing can go wrong.
Group work	I will try just to do my experiment but if others join me I sometimes let them do it all.	If the teacher shows or tells me what to do, I will do it, but if the others want something doing I let them do it themselves.	I often work well with others and do what part I have to do. Sometimes I can see things going wrong but I don't always put it right or tell the others.	I enjoy doing the experiments most times. I see the point of what we have to do, and get everyone doing something. I will always try to do what I want to but often let the others do it because they're just as good at that part.
Punctuality	I often make rough notes but I don't always write up my notes. If my notes aren't complete I won't hand my work in on time.	I sometimes write up my notes in full but often they are not complete. I usually hand in my work even though it isn't up to date.	Most of my work is complete and I usually hand in my work on time. I will always try to finish everything if I know there is a deadline.	I complete my work as much as I can. I sometimes put notes in from textbooks if I think it is needed. I need to know if my work is OK so I always hand it in.
Responsibility	I know I should always do the work I am set but I really don't see the point of the work. I know more or less what we have to do and do not feel that we have to explain it or *always* do it.	I will do what I have to because the teacher tells us to. I sometimes fail to complete the work if I feel it isn't very important.	I feel that it is important to complete the work to the best of my ability even though I don't understand it at the time.	It is important to work as best I can. If I don't know why I am doing an experiment, etc. I will ask the teacher.
Perserverance	I will try the experiment but if it goes wrong I cannot always mend it. I will wait for the teacher to help me.	I sometimes try to find out if my work is right. If an experiment doesn't work I will ask the teacher.	My experiments sometimes fail but I try various ways of getting it to work even if it takes most of the lesson.	Even if my attempts to get an experiment to work fail I will usually try various ways. If, however, time is getting short I will ask the teacher to help *and* ask him/her why it went wrong.

Table 5 *Self-assessment of practical work (from Wigan TVEI)*

We quote as our final example the work of the Hereford SSCR Group (**3.3**). They have produced a pupil profile in science for third-years. The profile has particular aims, and targets five categories of pupil achievement:

1 observing and interpreting in science;
2 mathematical skill in science;
3 communication in science;
4 practical skills in science;
5 personal and social skills in science.

Table 6 shows the assessment for achievement number 3, and Table 7 that for number 5. As with all profiles, the youngsters and the teacher share responsibility for completing it, although the youngsters are told it belongs to them. If they do not agree with a teacher's assessment they are instructed in the profile to talk to the teacher about it. The profile is intended to help youngsters and their parents identify the skills and attributes which the youngster owns, in order to act as the basis for predictions at the end of the third year.

		Pupil	Teacher	Date
1	Can read and understand simple written work on blackboard or in text book.			
2	Can understand simple diagrams of apparatus.			
3	Can write clearly so that any pupil of similar age would be able to read the work.			
4	Can write an account of an experiment in scientific terms that an adult scientist would use.			
5	Can draw and label a diagram of simple apparatus which has been seen or used.			
6	Can make own notes from a book or blackboard. (This does not mean copying.)			
7	Can understand and remember simple spoken instructions about an experiment given by the teacher.			
8	Can make own notes from what the teacher is saying so that later a full account can be written.			
9	Can describe how to carry out an experiment so that another pupil could perform the same experiment.			
10	Can understand a simple circuit diagram.			
11	Can read information from a table.			
12	Can draw a bar chart from data.			
13	Can construct a graph from information.			
14	Can construct and use a table to record experimental results.			
15	Can write a simple word equation.			

Table 6 *Assessment for communication in science (from Hereford* **3.3**)

		Pupil	Teacher	Date
1	Has shown responsibility in looking after a plant, animal or piece of equipment over a period of time.			
2	Puts apparatus away at the end of a lesson.			
3	Can work alone performing a simple experiment.			
4	Can work as a member of a group.			
5	Can work within any group of pupils and contribute to the group results.			
6	Can organise self and others in a group to get an experiment done.			
7	Presents neat work at all times.			
8	Shows an interest in science over and above that necessary for lessons.			
9	Can be relied upon by the teacher to carry out routine tasks.			
10	Is aware of the difficulties of others and tries to help.			

Table 7 *Assessment for personal and social skills in science (from Hereford* **3.3**)

What can science teachers do to assess health education in their lessons?

Some important considerations in formative assessment

The most important starting points for decisions about assessment are the aims and objectives of the course. Our aims are defined in Section 1.

We make the following seven suggestions to help teachers in drawing up to a formative assessment schedule, to start in year 1 and continue throughout a young person's school life.

1 *Sufficient time should be allocated to the process.* It is plain that in a busy curriculum, this is difficult. However, we feel that if this is not done, then ideas of negotiation and valuing of the youngsters' self-esteem will simply be discarded in the rush to 'get the job done', and the value of the assessment for the purpose of diagnosis will be severely curtailed.

2 *Youngsters and their parents should be made aware of the objectives teachers want to assess before the assessment begins.* If we are to provide a valuable formative experience for youngsters, so that they can grow in understanding, improve their skills and re-examine their attitudes, then it is important that they know where they are aiming. They are unlikely to make steady progress if they are not aware of the skills that teachers are looking for in

their assessments. Defining goals jointly with youngsters encourages them to play an active part in reaching these goals. If parents are kept informed of the aims and objectives of science education and health education, they are better able to support and encourage their offspring and the teachers, so that education becomes much more of a cooperative process. Ideally, we should involve them in the process of setting these objectives in the first place.

3 *Formative assessment should ideally be criterion referenced. Teachers, youngsters and parents should all be encouraged to produce their own criteria for each of the objectives, and the final criteria used should be achieved by a process of negotiation.* This aspect goes a considerable way towards achieving the second of our aims, which stresses the valuing of youngsters' personally held theories. It would be a mistake to assume that the only theories that youngsters held in science were concerned with scientific concepts. They have clear ideas about the degrees of progress towards a goal, which is how one might describe criterion-referenced assessment. Practice at exploring such degrees of progress and writing them down assists them in advancing carefully and steadily towards their goals. Furthermore, if we give youngsters practice at comparing *their* criteria for progress with those of others, then we are helping them to develop a necessary life skill in assessing and evaluating others in a fair way.

4 *The construction of assessments for cognitive aspects of the curriculum should be performed in such a way that youngsters' personal ideas are given value.* This is really the second part of our second aim. It implies a radical change in the structuring of assessment of knowledge. We feel that the assessment should be designed first to discover where youngsters start in their understanding of a concept. From there, the assessment should be based upon the coherence of the youngsters' personal theory. We are not suggesting that no marks should be awarded for having understood the orthodox scientific concept, but rather that this should only be a part of the assessment. Youngsters should be awarded marks for being able to make *their own ideas* explicit, explaining how they would use *their ideas* to solve a problem, and perceiving where their ideas failed to solve the problem in hand. This is a very different style of assessment. It places value not only on youngsters' own ideas but also on the *processes of using and changing those ideas*. Under such a style of assessment, a single mark awarded for 'the right answer' would be much rarer than it is at present in science examinations.

5 *The notion of progress in learning should begin where the youngsters feel they begin. In other words, the starting point for the gradient of progression should be decided by the youngster, not just by the teacher.* The whole notion of formative assessment, in our view, is about progression. Youngsters need to be able to see that they are progressing towards the goals that both the teacher and they themselves have outlined. Thus, it is important that the youngsters start that progress from where they feel most comfortable with their knowledge. Only then can they feel that they are genuinely making progress.

6 *Youngsters' own assessments of their progress should be an essential and valuable part of any assessment. It should be made clear that their assessment of their own progress carries equal weight with that of the teacher in any summative assessment based upon formative assessment.* However hard we strive for objectivity, all assessment is subjective to some extent. Thus young people's assessments of their own progress are no less valid than those of their teachers. It is important to acknowledge that *subjective* assessments are useful to the *subjects* themselves. We have all been through the experience of the development in our self-confidence that results from feeling that we have improved at something. In absolute terms, this improvement may in fact be very small, but in real terms to us, as learners, it may be very large by comparison with our previous position. It is this 'internal' — sometimes called subjective — assessment by the individual that we feel is an important and undervalued aspect of formative assessment. What is just as important, however, is that in order for youngsters to see that this knowledge of their own progress is important, it should be given an equal weighting with the views of teachers. Thus, any final summative grading of young people should be based equally upon their views.

7 *Youngsters and teachers should negotiate any comment to be placed upon a formal report to parents.* We see this as being an essential step in helping youngsters to take an active and responsible part in their own assessment, because at the end of the day, we would want to encourage them to bear some responsibility to their parents for their progress.

If these seven guidelines are followed, what does a formative assessment schedule look like in health and science education?

Developing a pupil profile in health education and science education

The Hereford Working Group outlined, in the Pilot scheme for profiling, six aims for drawing up and using profiles. Five of these (see Box 37) serve as useful ones for our profile.

1 Make explicit to students the desired outcomes of the course in terms of skills and abilities developed, in addition to knowledge gained.
2 Encourage students to see their own role and responsibilities in the learning and teaching process and to emphasise the care and concern of the teacher.
3 Provide guidance of weaknesses and learning difficulties for students' own self-help and for teachers' remedial teaching.
4 Reinforce for teachers the importance of the skills and abilities developed in a course, in addition to the factual content.
5 Provide both a curriculum development checklist and a curriculum evaluation method.

***Box 37** Five aims for profiling from Hereford* **(3.3)**

We have drawn up our profile to meet two of the aims of science education which are most pertinent to health and science. To remind you, these are:

- Study those aspects of science that are essential to an understanding of oneself, and of one's personal well-being.
- Discuss, reflect upon and evaluate pupils' personal understanding of key scientific concepts, theories and generalisations.

In the development of the profile, we have identified seven aspects of health and science education. We call these aspects categories of achievement for youngsters. These categories of achievement represent steps on the road to meeting the aims outlined above.

REFLECTIONS

What aspects would be important ones for the youngsters in your school to have on their profiles?

At what sort of age might young people begin to outline their own criteria for meeting objectives?

How would you go about helping them to be realistic in the development of their own criteria?

What methods might be used to involve parents in the writing of criteria for development in various skills and processes?

We have produced criteria for only five of our categories, as an example of how the process might be achieved. The categories of achievement are by no means exhaustive but they do go some way towards meeting our aims. The profile itself (Box 38) is addressed to the youngsters.

This profile is designed to help you see what your science teachers want you to be able to do and understand about your own health. There are seven groups of things they are looking at. Each group has five progress steps in it. In some cases, your teacher will tell you what she thinks these five steps are. In other cases, she will ask you to decide for yourself what the steps are in being able to do the things outlined. Sometimes she will ask you to decide what other things you think you ought to be able to do and understand about your own health, so you may end up with more than seven groups.

These are your teacher's seven groups. They are called

Categories of achievement

The teacher wants you to be able to do the following things:

1 *Understand and analyse information about health.* An example of this might be being able to understand the different arguments that butter and margarine makers write about the effects of their products on your body.
2 *Use personal and social skills in science lessons.* This means being able to help and cooperate when your group is doing an experiment, for instance, listening to others explaining their ideas.
3 *Use the things you learn in science lessons to help you make choices about your health behaviour.* For example, trying different sports until you find one you like, because you've learnt that exercise helps your body 'to work more efficiently'.
4 *Use science equipment safely.*
5 *Persevere.* This means not giving up easily — in practical lessons, for example.
6 *Develop a different understanding of science-related ideas about health.* You might have thought, for example, that you could catch AIDS by touching someone who had it. After your lessons, you might realise that this idea wasn't quite accurate and your understanding has changed.
7 *Communicate your ideas about science and health to other people.* This means explaining what *you* understand about science- and health-related topics.

The profile belongs to you. From time to time during the year, the teacher will ask you to decide what step you are at and she will also decide what step she thinks you are at. She may want to talk to you about her decision so that you can help her to fill in the report for your parents.

***Box 38** Pupil profile in science aspects of health education*

CATEGORY OF ACHIEVEMENT	INCREASING COMPETENCE →			
Develop a different understanding of science-related ideas about health.	I know something about the ideas the teachers are talking about but I'm not sure I understand all of it.	My ideas about the topic are not the same as the ones the teacher explains and sometimes my ideas don't help me to solve problems the teacher sets or I meet outside school.	I am beginning to understand the teachers' ideas better now. I think my original ideas about this topic have changed a little and my new ideas help me to make choices a little more easily.	I really understand what the teacher means and I can explain it to my friends and parents so they understand and use it to help make decisions.
Use science equipment safely.	I can do most experiments without causing any real damage apart from burning the bench or rubber clamp covers. I sometimes leave my experiment if we are talking etc.	I can use the equipment but I sometimes leave it to boil dry or tip over etc. I need to be told which experiments need watching.	I can use the equipment even if it could be unsafe. I rarely leave my experiment but I do need to be told sometimes.	I realise that even simple equipment could be a danger and if I have to leave my experiment I make sure nothing can go wrong.
Persevere.	I will try the experiment but if it goes wrong I cannot always mend it. I will wait for the teacher to help me.	I sometimes try to find out if my work is right. If an experiment doesn't work I will ask the teacher.	My experiments sometimes fail but I try various ways of getting it to work even if it takes most of the lesson.	Even if my attempts to get an experiment to work fail, I will usually try various ways. If however time is getting short I will ask the teacher to help and ask him/her why it went wrong.
Use personal and social skills in science.	I try to do all the work set and join in with others in my group but sometimes I just let them do it all.	I let others get on with what they're doing in my group and share my ideas but sometimes I'm not really interested in their ideas. I don't always finish what I'm doing or help to clear up.	I try to work well with others but sometimes I want everything done my way. I want to do the interesting bits but I don't always join in the clearing up.	I try to listen to others' ideas and help the whole group to finish the job the teacher has asked us to do. I try to make sure everyone in the group can contribute.
Using science to help you make choices about health.	I enjoy science and learning about keeping healthy but I don't really think the things they teach apply to me.	Sometimes when I remember the things we learn about health I wonder if I should behave differently and sometimes I try but I forget.	Sometimes I try really hard to use the things they teach us about nutrition, for example, and I'm beginning to feel healthier as a result.	I think science really helps you to decide about different choices in health. I'm much more aware of the way things affect my health now.

Table 8 *Criteria for pupil profiling in science aspects of health education (from Wigan TVEI)*

Involving youngsters in assessment

The profile in Table 8 is addressed to the youngster. Its completion is a negotiated process between pupil and teacher. Obviously this is a very time-consuming job, but it does have its advantages, as the Wigan TVEI group make plain in *A broad range of science modules* (**3.3**):

> *Profiling may be perceived as a mechanism whereby the achievements, qualities, and aspirations of a pupil may be made more explicit [not only to the assessor, but also to the pupil]. This may occur as a result of more detailed assessment and recording, or through consultation between teacher and pupil, or perhaps ideally through a happy amalgam of the two.*

Wigan TVEI go on to say that a negotiated assessment is an assessor–pupil dialogue about the aims, objectives and outcomes of a learning situation, and it is likely to promote greater mutual understanding. Participation, Wigan TVEI say, does not imply that pupils can persuade their teachers that their professional judgement is incorrect. Teachers become aware of pupils' perception of the learning situation and thus gain the opportunity to improve the quality of learning for the pupils.

But, say Wigan TVEI, negotiated assessment, as well as being a sharing of perceptions, will also give a profile which can be a useful indication of the learner's position with respect to the requirements of externally validated and certificated courses. Because teacher and pupil share this information, they can compare their understanding of the learner's position in relation to the specified objectives.

Wigan TVEI continue:

> *The strategy for the use of any such profile is important, however, if it is to achieve maximum effect.*
>
> 1 *The profile is given to the pupil without any comments.*
> 2 *The pupil is asked to indicate on each category the position which he/she feels best describes his/her situation. (Some pupils indicate this with a tick, a shaded line or a bar graph response.) The pupil should not feel confined to any one descriptor and should be encouraged to reflect his/her own interpretation.*
> 3 *The 'completed' profile should then be considered by the teacher who indicates where he/she thinks the pupil is, in relation to each of the categories.*

4 *The teacher and pupil are now ready to begin the discussion, centring on the statements both partners have made on the profile. Where agreements or discrepancies between responses occur, teachers and pupils can begin to exchange ideas and share explanations.*
5 *The result of such discussions should be a further plan for future learning experiences or comments useful to both parties on the value of past learning experiences.*

The approaches to such profiling discussions may be different in each centre, class or even between individuals, yet the purposes will be common:

1 *to develop an understanding of the perceptions of the people involved in the learning situation;*
2 *to clearly indicate, in as much detail as is reasonable, a 'true' estimation of a pupil's achievements.*

If youngsters are to be active learners, they need to know what is expected of them, help to set the targets for reaching these goals and be involved in the measurement of their achievement of the targets.

SECTION NINE

Aspects of evaluation of health education

In this section we shall limit ourselves to the evaluation of two things:

- health education materials;
- health education as an area of study spanning several subjects.

Case Study 9 is presented as an evaluation of cross-curricular health education.

Criterion 1

The materials ought to contextualise health education in a broad, cross-curricular framework.

1 Can colleagues and other departments contribute to the topic materials?
2 How can colleagues contribute?
3 What contributory topics do they teach?
4 Can the timing of different departments be coordinated?
5 Can the teaching methods outlined be usefully adapted to science lessons?
6 Can the resources of other departments be of value in teaching science?
7 Can parents contribute?
8 What can outside experts contribute?
9 Does the material give guidance on how they might contribute best?
10 Does the material involve contributions from school health personnel?
11 Does it pinpoint aspects of the 'hidden curriculum' which impinge on this area?
12 Does it allow youngsters to contribute from their own existing expertise?
13 Can it be adapted to fit the aims of the science department?

***Box 39** Criterion 1 for evaluation of course materials*

Criteria for evaluation of course materials

The criteria for evaluation of course materials are based on two sources: Ebbutt and West (**9.1**) and Bentley (**9.2**). There are four main criteria, each with a list of questions which act as sub-criteria. Not every question will be relevant to all materials. The criteria will measure the usefulness of the material in a school's health and science courses and will indicate how much it may need to be developed or adapted.

Criterion 2

The materials ought to encourage youngsters as active decision makers.

1 Does the material suggest ways of finding out the extent of the pupils' previous knowledge?
2 Does it suggest ways of starting where pupils are?
3 Does it use teaching methods suitable for cognitive and affective development?
4 Does it ensure that pupils know what is expected of them in each lesson?
5 Are the recommended teaching strategies the ones that are best suited to achieving a wide variety of aims?
6 Does the material encourage pupils to develop responsibility for their own learning and decision making?
7 Does it promote learning atmospheres which will support each pupil in competent handling of the topic?
8 Does it positively encourage pupils in supporting others' expressions of ideas?
9 Does it enable pupils to understand that attitudes of respect, trust and open questioning are being positively fostered?
10 Is there congruence between aims, teaching strategies, student tasks, content and assessment procedures?

***Box 40** Criterion 2 for evaluation of course materials*

Criterion 3

The material ought to specify resources required and advise on their availability and feasibility in use.

1 Are the resources required available in school?
2 Can they be borrowed from a health education centre?
3 Can they be borrowed from a museum?
4 Are the time resources specified?
5 Are the time resources adequate for pupils to develop and share ideas and previous experiences, and feelings about the topic?
6 Are the time resources adequate for pupils to practise the skills which the lessons aim to enhance?
7 Are the time resources adequate for pupils to reach their own conclusions about health-related behaviour?
8 Is enough time allowed for pupils to work on their own ideas to a satisfactory solution?
9 Is there advice about the level of skill needed by teachers in handling different teaching approaches?
10 Are methods of classroom organisation specified?

Box 41 *Criterion 3 for evaluation of course materials*

Criterion 4

The materials ought to enhance youngsters' opportunities to examine and share values.

1 Does the material erect undesirable stereotypes?
2 Does the material encourage reflection on the limitations and values of science to health?
3 Is the language level accessible by the intended audience?
4 Does it make special provision for the sharing of cultural values?
5 Does it make special provision for the sharing of gender values?
6 Does it present a range of values?
7 Does it give accurate representation of people's views and values?

Box 42 *Criterion 4 for evaluation of course materials*

REFLECTIONS

What are your criteria for judging health education materials as useful?

What problems does it create for science teaching if the criteria you apply to your science materials are different from those for health education materials?

Should the criteria for health and science materials be the same?

How can young people become involved in evaluating materials for courses?

These are our criteria. They give an indication of the priorities that we feel are important in examining materials for use in teaching about issues of health. Individual schools will have their own criteria which they have developed from their health education policy, or from the policy of their LEA. Individual teachers will also have their own criteria which fit the aspects of learning that they consider to be important. What is important is not so much what the criteria say, as that they are explicit and consistent so that others can see how judgements are being made and what is being looked for.

Evaluating a course in health education

Our final case study (Case Study 9) gives an example of the ways in which one teacher went about evaluating a cross-curricular health education study on smoking. The description of what the school did is given in Case Study 5 (at the end of Section 4).

We are concerned not so much with whether the work was itself successful, that is with the outcomes of the evaluation, as with the strategies the teacher used to find out whether the course was working.

We outline as follows three important characteristics of this study which we think may apply generally to evaluations.

Several viewpoints were taken into account

The teacher ensured that there were methods for taking the opinions of colleagues, young people and parents into account. This was done formally, by questionnaire and informally, by keeping a diary of evaluative comments.

There were several strands to the evaluation

As we see them, these concerned four major issues: understanding and attitudes; enjoyment; value judgements of young people; and indications for future developments. The teacher obviously wanted to know whether the project had been successful in achieving its stated aims. Thus, the questionnaire asked about youngsters' change in knowledge and attitudes. He also wanted to know what enjoyment young people had gained from the course. He investigated what they saw its value to be, and incorporated their value judgements in the work.

Different methods of evidence collection were employed

The teacher used questionnaires, open ended and

closed, although as he points out, the return of these was not substantial. He kept a personal diary, and interviewed colleagues, albeit informally, to discover their opinions. There are several other techniques that might be used, for example: evidence from assessment with young people; tape recording the discussions of youngsters working in small groups (with their permission); interviewing youngsters; having colleagues — or parents — in lessons as field-work observers; having youngsters keep diaries.

Case Study 9: Evaluating a cross-curricular study on smoking

by Mick Nott, North West Regional Project Officer, SSCR

The study was evaluated in three main ways:

1 questionnaires for children;
2 observations from participating staff through open-ended questionnaire;
3 teacher diary.

Questionnaires

For young people

There are two questionnaires for pupils. The pupils were given them at the end of the week's work and asked to return them to a particular member of staff on the next Monday. The first questionnaire was a scale type of attitude test which gave a range of five possible answers from 'strongly agree' to 'strongly disagree'. The questions focused upon:

- interest;
- overlap in lessons involved;
- the usefulness of the knowledge in the eyes of the pupils;
- attitudes to smoking;
- teaching styles;
- parental interest in the project.

The percentage return for this questionnaire was high and the answers will be analysed by means of a computer. Youngsters in senior forms are involved in entering and analysing the data, but as yet (July 1986) this job is not completed. The results will, however, be published later.

The second questionnaire was a more open-ended one in which young people were invited to make their own comments on issues such as:

- their previous knowledge of smoking education work;
- their expectations of the week;
- their likes and dislikes from the work;
- the most worthwhile parts of the work;
- possible improvements;
- parental involvement with the work.

The response to this questionnaire was much smaller than to the first questionnaire, and almost exclusively from girls. Both questionnaires were anonymous and asked for information about the respondent's smoking habits, age, sex and whether family members smoked.

Pupil responses in this questionnaire included such comments as:

It has helped me to know better what I've done to myself.

I've learnt what my mum and dad are doing to themselves.

If I was a teacher I would take the class to a hospital and show them the effects smoking has. I would also explain the cost to the Health Service in treating smokers.

My mum said it was a good thing to have this sort of education.

It has changed my attitudes because now I know what it does to your heart and how much goes in your body.

I just hope you do it again next year when the next first-years come to the school. It makes you change your mind about smoking.

For teachers

The questionnaires were given out to all the teachers from different departments who took part in the Smoking Education Week.

The questionnaire was entirely open-ended and focused upon such aspects as:

- What did you do in the lessons?
- What did children do in the lessons?
- What did children learn?
- What did you learn?
- How worthwhile was it?
- If you were asked to do it again how would you improve it?

The questionnaires were anonymous, and sought information about the respondent's sex, smoking habits, teaching subject and number of periods devoted to the work.

Teachers' comments included:

Very worthwhile. Enthusiastic response. Busy classes — everyone had a go.

The pupils passed on information from their science lessons which was new to me — (French, history).

[I've learnt] that departments can work together towards the same aim. — (Art, music, science).

In the future it would be nice to work together more closely and know what each other was doing.

Teacher diary

The organiser of the Smoking Education Week also

collected ad hoc comments made to him by members of staff during the week as they taught various lessons. These comments could be thought of as being in the nature of a diary, since they were collected as members of staff were having different experiences with the work, and they were in some ways a set of 'snapshots' into the members' evaluations at different times. The organiser detected enthusiasm and willingness to be involved from all the teachers taking part.

Their comments included:

The children are disappointed if the lesson doesn't focus on smoking education.

It's good to engage in work that you know has some relevance to other subjects. Every child has managed to bring the folder and booklet to every tutorial period. — (year tutor).

It's a useful thing to have a particular piece of work on which to concentrate rather than just debating the theory of cross-curricular working.

The discussion was enjoyable, but I'm not sure how much their mathematical skills were improved by the discussion about the costs of smoking. — (maths teacher).

The children do their work with a purpose and make great efforts at measuring their fitness now. — (PE teacher).

The pupils have shown real creativity and imagination in the production of their posters. This work has really challenged their graphical skills and abilities and made them realise the difficulties of producing high standards, and the rewards when they do so. — (art teacher).

These comments give some idea of the range of issues which were suggested in the diary. They illustrate its usefulness as a means of recording 'snapshot' evaluative judgements.

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The Secondary Science Curriculum Review (SSCR) was set up in 1981 to stimulate, through working groups of practising teachers, the development of science studies which would help to provide an appropriate science education for *all* young people growing up in a scientific and technological society — whatever their abilities or career intentions. Its concern was not only with the science curriculum — its contents, purposes, teaching methods and resources — but also with the role of science in general education and within the whole school.

The **Better Science: Curriculum Guides** are based on the combined experience of the Review's Central Team and the working groups. Each Guide deals with a different but significant area of concern. Together they aim to assist teachers both in devising a broader and more balanced approach to science studies and in enhancing their professional development. The intention throughout is not necessarily to provide answers but rather to provoke and encourage teachers' thinking about the various topics addressed.

This Guide, **Better Science: Health and science education,**

- tackles some basic questions about health education from the perspective of science teachers;
- gives suggestions and recommendations for how science teachers might plan their contribution to a coordinated health education course in a school;
- provides examples of teaching approaches and materials which science teachers can use to broaden their science teaching in a health context;
- uses a number of case studies to show how science teachers working with the Review have implemented many of the suggestions and recommendations.

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